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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF PREVENTION, PESTICIDES, AND TOXIC SUBSTANCES
WASHINGTON, D.C. 20460

July 27, 2007

MEMORANDUM

SUBJECT: **MCPP-p:** 2nd Revised Occupational and Residential Exposure and Risk Assessment for the Reregistration Eligibility Decision (RED)
[PC Code 129046, DP Barcode D322766]

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And
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Attached is the 2nd Revised Occupational and Residential Exposure and Risk Assessment for the MCPP-p RED. This assessment has been revised as appropriate to address public comments. Only typographical revisions were made. Additional revisions were not warranted for reasons outlined in the response to comments document (D341284).

Expo SAC Reviewers: Jack Arthur and Margarita Collantes (1/25/2007)

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Executive Summary

MCPP-p Use Description

Based upon the MCPP-p Use Closure Memo, there are registered products of MCPP-p intended for both occupational and residential uses. The registered occupational uses include sod farms, pastures, rangeland and rights-of-way areas. Residential uses include broadcast and spot treatment on golf courses and lawns.

Toxicology Considerations:

MCPP-p (acid) is of low to moderate acute toxicity (i.e. Tox Category III or IV) via the oral or dermal routes of exposure. The acute toxicity via inhalation exposure is unknown because the applicable study was rated as unacceptable. MCPP-p (acid) is a severe eye irritant (Tox Category I); however, it is a mild skin irritant (Tox Category III) and it is not a skin sensitizer. MCPP-p DMAS is of moderate toxicity (i.e. Tox II) via oral exposure and of low toxicity via dermal exposure.

The following Points of Departure (PODs) were used for assessing MCPP-p occupational and residential risks:

- An oral NOAEL of 175 mg/kg/day from an acute neurotoxicity study in rats during which Functional Observation Battery changes were observed at a LOAEL of 350 mg/kg/day. This POD is applicable to acute granule ingestion exposures.

- An oral NOAEL of 35 mg/kg from a subchronic neurotoxicity study in rats during which decreased body weight, decreased absolute adrenal weight, increased liver enzymes, increased absolute and relative liver weight and histological changes were observed with a LOAEL of 189 mg/kg/day. This NOAEL is applicable to short/intermediate term inhalation exposures for adults and short term/intermediate term incidental oral exposures for children.

PODs were not selected for dermal exposures because no systemic toxicity occurred at the limit dose of 1000 mg/kg/day in dermal rabbit or rat studies with MCPP-p (acid), MCPP-p DMAS or MCPP-p ester. In addition, the developmental toxicity which occurred in the rat developmental study with MCPP-p was accompanied by decreased maternal body weight, and body weight decrements that did not occur in any of the dermal studies indicating that developmental effects would not be expected from dermal dosing at the limit dose. No developmental toxicity occurred in rabbit studies with MCPP or MCPP-p.

The target MOE for occupational and residential exposures is 100, which includes the standard safety factors of 10X for intraspecies variability (i.e. differences among humans) and 10X for interspecies variability (differences between humans and animals).

Occupational Handler/Applicator Exposure and Risk Estimates:

The MOEs for occupational exposures were calculated for short/intermediate term inhalation exposures using standard assumptions and unit exposure data. The unit exposure data were taken from the Pesticide Handers Exposure Database (PHED) and the Outdoor Residential Exposure Task Force (ORETF) studies for professional lawn care operators. All of the MOEs exceed the target MOE of 100 with baseline PPE which means that the risks are below EPA's level of concern and respiratory protection is not needed.

Data Used for Turf Post Application Exposure Assessment

There are three turf transferable residue studies that were submitted by the Broadleaf Turf Herbicide TFR Task Force. All of the studies were reviewed by HED and were found to meet the series 875 guideline requirements for postapplication exposure monitoring. Because TTR data only apply to dermal exposures and a dermal assessment is not needed for MCPP-p, the TTR data were not directly used in this assessment. The TTR data do indicate the rate of dissipation, however, and were used for risk characterization.

Post-Application Occupational Exposure and Risk Estimates:

Occupational post application dermal exposures were not assessed because no dermal PODs were selected. Inhalation exposures were not assessed because MCPP-p has a low vapor pressure and is only applied as a coarse spray outdoors. The Restricted Entry Interval for MCPP-p is 48 hours, based on WPS requirements, because it is a severe eye irritant (i.e. Toxicity Category I).

Residential Applicator Exposure and Risk Estimates:

The residential products are typically formulated as dry weed and feed products or as liquids in concentrates or ready-to-use sprays. Spot and broadcast treatments are both included on the labels. The MOEs for residential handlers exposures were calculated using standard assumptions, maximum label rates and PHED and ORETF unit exposure data. The MOEs exceed the target MOE of 100 which means the risks are below EPA's level of concern.

Residential Turf Post Application Exposure and Risk Estimates

The residential turf exposures were calculated using the Residential SOPs, maximum label rates and the TTR data. The MOEs were then calculated using the incidental oral POD of 35 mg/kg/day and they exceed the target MOE of 100. This means that the risks are below EPA's level of concern.

Residential Turf Granule Ingestion Exposure and Risk Estimates

The exposures for toddlers ingesting granules that have been applied to residential turf were assessed using a standard method as outlined in the Residential SOPs. The MOEs were then calculated using the acute dietary POD of 175 mg/kg/day and they exceed the target MOE of 100. This means that the risks for toddler exposures from granular ingestion are below EPA's level of concern.

Risk Characterization

The risk assessment for post application turf exposures is conservative because it is based upon day 0 TTRs and soil residue values and did not account for dissipation. The TTR data indicated that dissipation was fairly rapid with a maximum half life of 1.2 days. In addition, the toxicity POD is based on a number of general effects including decreases in body weight, decreased adrenal weight, increase in liver enzyme, and increase in liver and kidney weights, and these effects probably do not occur until several days after repeated exposure.

The actual use rates of MCPP-p are typically less than the maximum label rates because MCPP-p is usually mixed with other herbicides (e.g. 2,4-D) to improve weed control.

Only a few MCPP-p products are formulated as wettable powders and most of these products are packaged in water soluble bags for turf use.

Some of the end use product labels require waterproof gloves instead of chemical resistant gloves. It is not known if these gloves provide adequate protection for MCPP-p.

1.0 Background Information

The following active ingredients are included in this assessment:

Abbreviation	Chemical Name	PC Code
MCPP-p (acid)	(+)-(R)-2-(2-methyl-4-chlorophenoxy) propanoic acid	129046
MCPP-p DMAS	(+)-(R)-2-(2-methyl-4-chlorophenoxy) propanoic acid, dimethylamine salt	031520
MCPP-p K salt	(+)-(R)-2-(2-methyl-4-chlorophenoxy) propanoic acid, potassium salt	119046

For the purposes of this assessment, all of the above active ingredients are collectively referred to as MCPP-p.

1.1 Purpose and Criteria for Conducting Exposure Assessments

Occupational and residential exposure and risk assessments are required for an active ingredient if: (1) certain toxicological criteria are triggered **and** (2) there is potential exposure to handlers during use, or to field workers entering treated areas after application is completed. MCPP-p meets both criteria. Many of the MCPP-p products also contain other registered active ingredient herbicides including other phenoxy herbicides such as 2,4-D. These ingredients are not addressed in this risk assessment.

1.2 Toxicological Considerations

A summary of the acute toxicity results is included in Table 1. These results indicate that MCPP-p (acid) is of low to moderate toxicity (i.e. Tox Category III or IV) via the oral or dermal routes of exposure. The acute toxicity via inhalation exposure is unknown because the applicable study was rated as unacceptable. MCPP-p (acid) is a severe eye irritant (Tox Category I); however, it is a mild skin irritant (Tox Category III) and it is not a skin sensitizer. MCPP-p DMAS is of moderate toxicity via oral exposure and of low toxicity via dermal exposure.

Table 1 - Acute Toxicity Profile of MCPP-p

Guideline	Study Type	MRID	Results	Toxicity Category
MCPP-p (acid)				
870.1100	Acute oral (rat)	42947801	LD_{50} = 775 mg/kg	III
870.1200	Acute dermal (rat)	42947802	LD_{50} > 2000 mg/kg	III
870.1300	Acute inhalation (rat)	42947803	**N/A – Study is Unacceptable**	
870.2400	Acute eye irritation (rabbit)	42947804	Opacity, redness, discharge for 72 hr	I
870.2500	Acute dermal irritation (rabbit)	42947805	Redness and sloughing at 10 days	III
870.2600	Skin sensitization	43749601	Non-sensitizer	N/A
MCPP-p (DMAS)				
870.1100	Acute oral (rat)	42614701	LD_{50} = 414 mg/kg	II
870.1200	Acute dermal (rabbit)	42614703	LD_{50} > 2000 mg/kg	III

The toxicological Points of Departure (PODs) used to complete the occupational and residential exposure assessments are summarized in Table 2. PODs were selected only for inhalation and incidental exposures. PODs were not selected for dermal exposures because no systemic toxicity occurred at the limit dose of 1000 mg/kg/day in a dermal rabbit study with MCPP-p (acid), or in dermal rat studies with the MCPP-p DMAS or MCPP-p ester. In addition, the developmental toxicity which occurred in the rat developmental study with MCPP-p was accompanied by decreased maternal body weight, and body weight decrements did not occur in any of the dermal studies indicating that developmental effects would not be expected from dermal dosing at the limit dose. No developmental toxicity occurred in rabbit studies with MCPP or MCPP-p.

Table 2 - MCPP-p Toxicological Points of Departure (PODs) Used for Occupational and Residential Risk Assessment

Exposure Scenario	Point of Departure or Factor Used in Risk Assessment	Study and Toxicological Effects
Acute Dietary	Oral NOAEL = 175 mg/kg/day	Acute Neurotoxicity Study in Rats LOAEL = 350 mg/kg/day based on Functional Observation Battery (FOB) changes.
Incidental Oral Short/Intermediate Term	Oral NOAEL= 35 mg/kg/day	Subchronnic feeding/Subchronic neurotoxicity study in rats with MCPP-p. LOAEL = 189 mg/kg/day based on decreased BW, increased water consumption; decreased hematological parameters, decreased absolute adrenal weight and lipid storage in adrenals, increased liver enzymes (F), increased absolute/relative liver wt and microscopic changes; kidney cells in urine of high-dose males.
Dermal Short/Intermediate/ Long Term	N/A	No toxicity at 1000 mg/kg/day and no developmental toxicity concerns by dermal route.
Inhalation Short/ Intermediate/ Long Term	Oral NOAEL= 35 mg/kg/day	Same as above for incidental oral
Cancer	Classification: Not likely to be carcinogenic to humans	
Target MOE for Residential Exposures	100 Inhalation 100 Incidental Oral	Includes standard uncertainty factors of 10 and 10 for intraspecies variability and interspecies extrapolation.
Target MOE for Occupational Exposures	100 Inhalation	Same as above.
* Inhalation absorption is assumed to be equivalent to oral absorption (100 percent default value).		

1.3 Incident Report

An incident report for MCPP-p is currently being prepared by the Chemistry and Exposure Branch of HED and is not yet available.

1.4 Summary of Use Patterns, Formulations and Application Methods

Uses

There are registered products of MCPP-p intended for both occupational and residential use sites. The occupational use sites include turf farms and rights-of-way (ROW). Residential use sites include home lawns and golf courses. Based upon available pesticide survey usage information for the years 1990-1998, the Biological and Economic Effects Division (BEAD) of EPA estimated in 2000 that the total annual domestic usage of MCPP was approximately 5.1 million pounds active ingredient (ai). A listing of the use sites ranked by the amount used is given in Table 3.

Table 3 - EPA's Quantitative Usage Analysis for Mecoprop (MCPP)

Use Site	Average Amount Used (pounds)	Percent of Total Used
Homeowner Applied to Lawns	3,743,000	73%
PCO Applied to Lawns	1,196,000	23%
Golf Courses	143,000	3%
Turf Farms	41,000	<1%
Total	5,124,000	

Source: EPA BEAD, 9/18/2000.

It should be noted that most of the above usage information was based upon the racemic form of MCPP, and does not account for the conversion to the single isomer form of MCPP (i.e. MCPP-p) which began in 1994. According to the MCPP-p Smart Meeting, the net result of this conversion to single isomer compositions is that the amount of MCPP-p now applied per year is about four million pounds as the single isomer form, rather than eight million pounds as the racemic form.

Mode of Action and Targets Controlled

MCPP-p, like other phenoxy herbicides, has an auxin-like effect (auxin is a growth hormone) on broadleaf plants. This effect consists of elongation of the growing terminals, distortion, and in 7 to 10 days collapse, withering and death.

Formulation Types and Percent Active Ingredient

As discussed in the Use Closure Memo of 10/4/2006, the MCPP-p Task Force is only supporting three forms of MCPP-p. A listing of these forms and the number of associated end use product labels (per OPPIN) is included in Table 4. The acid and dimethylamine salt (DMAS)

forms have the most products. The commercial and agricultural products are generally formulated as liquids and standard granules. Two acid products (2217-784 and 2217-814) are wettable powders and are labeled for professional applicator use on turf. The residential products are typically formulated as granular weed and feed formulations or as liquids in concentrates or ready-to-use sprays. One DMAS residential product (228-190) is formulated as an aerosol spray can which was recently registered (4/19/2005).

Table 4 - MCPP-p Forms and Number of End Use Product Labels

MCPP-p Form	PC CODE	Number of Labels	Predominant Formulations	Other Formulations (Registration Number)
Acid	129046	79	Liquids and granules	WP (2217-814) WP (2217-784)
Dimethylamine salt (DMAS)	031520	177	Liquids and granules	Aerosol Can (228-190)
Potassium Salt	119046	5	liquids	None

Application Rates, Timing and Frequency of Applications

The labels typically specify that a maximum of two applications can be made per growing season. The label required spray volumes range from 20 gallons per acre for weed control to 600 gallons per acre for vine and brush control. The application rates are included in Table 5 and are given in terms of acid equivalent (ae). As stated in the Use Closure Memo, the MCPP-p Task Force has agreed to a maximum application rate of 1.2 lb ae for broadleaf weed control on ornamental turf sites (golf courses, cemeteries, parks, sports fields, turfgrass, lawns and other grass areas), sod farms and Non-Turf Areas (roadsides, rights-of-way (ROW) and other similar non-crop areas).

The Use Closure Memo does not include application rates for woody plant control in non-turf areas. These rates are present on only a few labels and are expressed in terms of the amount of product mixed per amount of spray and applied per 43,500 square feet (i.e. one acre). Some of the rates for woody brush control exceed 1.2 lb ae/acre because up to 600 gallons of spray are applied per acre. The highest rate of 11.0 lb ae/acre is from label #228-410 which was accepted in March 2004.

Table 5 - MCPP-p Application Rates

Site	Acid Equivalent Application Rates Per Application (lb ae/acre)		
	Smart Meeting[1]	Product Labels	Typical Label Instructions
Turf, Lawns	1.2	N/A	For best results treat when weeds are young and actively growing. Do not apply more than 2 broadcast applications per year per treatment site.
Turf, Golf Courses	1.2	N/A	
Sod Farms	1.2	N/A	

Table 5 - MCPP-p Application Rates			
Site	**Acid Equivalent Application Rates Per Application** (lb ae/acre)		
	Smart Meeting[1]	**Product Labels**	**Typical Label Instructions**
Non-Turf Areas[2] -- Woody Plant Control	N/A	5.7 Several labels[3] 11.0 Maximum Label[4]	Add X gallons (depending on product) to 100 gallons of water applying 200 to 600 gallons of spray mixture per 43,500 square feet.

1. As listed in the MCPP-p Smart Meeting of 01/10/2006.
2. Includes roadsides, ROW and other similar non-crop areas.
3. Includes labels 228-206, 228-178, 10404-43 and 14774-2.
4. Includes Label 228-410.

Application Methods

The MCPP-p labels specifically prohibit chemigation and do not include instructions for aerial application. Based upon this information as well as Agency knowledge of typical practices for herbicide application to turf, it was assumed that only ground applications would occur. A listing of application methods and area treated or amount applied per 8 hour day is included in Table 6.

Table 6 - MCPP-p Application Methods		
Application Method	**Site**	**Area Treated or Amount Applied per Day**[a]
Groundboom	Golf Course Turf Sod Farm Turf	40 acres 80 acres
Rights-of-Way (ROW) Sprayer	Non Turf Areas	1000 gallons
Turfgun (mix/load/apply) Turfgun (mixer/loader for 20 person crew) Turfgun (apply only)	Turf	5 acres 100 acres[b] 5 acres
Backpack Sprayer - Mix/Load/Apply	Non Turf Areas	40 gallons
Tractor Drawn Broadcast Spreader	Golf Course Turf Sod Farm Turf	40 acres 80 acres
Push Type Broadcast Spreader	Turf	5 acres

a. Based upon HED ExpoSAC SOP #9 "Standard Values for Daily Acres Treated in Agriculture", Revised July 5, 2000
b. Based upon a mixer loader at a central location supporting a crew of 20 PCOs.

2.0 Occupational Handler/Applicator Exposures & Risks

2.1 Exposure Scenarios

Based upon the application methods listed in Table 6, the following exposure scenarios were assessed.

Mix/Load Wettable Powder Formulations
Mix/Load Dry Flowable Formulations
Mix/Load Liquid Formulations
Load Granules
Groundboom Application
Turfgun Application
Backpack application
ROW Application
Broadcast Spreader Application
Mix/Load/Apply Liquids with a Backpack Sprayer
Mix/Load/Apply Wettable Powder with a Turfgun
Mix/Load/Apply Dry Flowables with a Turfgun
Mix/Load/Apply Liquids with a Turfgun
Load/Apply Granules with a Push Cyclone

2.2 Occupational Handler Exposure Assumptions and Data Sources

Exposure Assumptions

The following assumptions and factors were used in order to complete the exposure and risk assessments for occupational handlers/applicators:

- The daily acreages treated were taken from EPA Science Advisory Council for Exposure Standard Operating Procedure #9 "Standard Values for Daily Acres Treated in Agriculture," Revised July 5, 2000. These values are listed in Table 6.
- The application rate for turf areas is 1.2 lb ae per acre as listed in the MCPP-p Use Closure Memo.
- The application rate for woody plant control in non-turf areas (i.e. ROW) is 0.0093 lb ae per gallon based upon the Label #228-410.
- A body weight of 70 kg was assumed because the POD is not gender specific.
- Since the POD for inhalation exposures was derived from an oral study, it is assumed that there will be equivalent toxicity from the oral and inhalation routes of exposure.
- Baseline PPE indicates that no respirator use is assumed.

Handler Exposure Data Sources

The handler exposure data were taken from the Pesticide Handler Exposure Database (PHED) and the Outdoor Residential Exposure Task Force (ORETF). The PHED data were used primarily for the golf course, sod farm and ROW scenarios and the ORETF data were used for lawn care scenarios. A summary of each data source is provided below.

PHED Data

PHED was designed by a task force of representatives from the US EPA, Health Canada, the California Department of Pesticide Regulation, and member companies of the American Crop Protection Association. PHED is a software system consisting of two parts – a database of measured exposure values for workers involved in the handling of pesticides under actual field conditions and a set of computer algorithms used to subset and statistically summarize the selected data. Currently, the database contains values for over 1,700 monitoring events. The distribution of exposure values for each body part (e.g., chest, upper arm) is categorized as normal, lognormal, or "other" (i.e., neither normal nor lognormal). A central tendency value is then selected from the distribution of the exposure values for each body part. These values are the arithmetic mean for normal distributions, the geometric mean for lognormal distributions, and the median for all "other" distributions. Once selected, the central tendency values for each body part are composited into a "best fit" exposure value representing the entire body.

The unit exposure values calculated by PHED generally range from the geometric mean to the median of the selected data set. To add consistency and quality control to the values produced from this system, the PHED Task Force has evaluated all data within the system and has developed a set of grading criteria to characterize the quality of the original study data. The assessment of data quality is based upon the number of observations and the available quality control data. These evaluation criteria and the caveats specific to each exposure scenario are summarized in Table B2 of Appendix B. While data from PHED provide the best available information on handler exposures, it should be noted that some aspects of the included studies (e.g., duration, acres treated, pounds of active ingredient handled) may not accurately represent labeled uses in all cases. HED has developed a series of tables of standard unit exposures for many occupational scenarios that can be used to ensure consistency in exposure assessments.

ORETF Data

Handler exposure data generated by the Outdoor Residential Exposure Task Force (ORETF) were used for assessing the lawn care operator scenarios. These studies are summarized in the HED Memorandum "Summary of HED's Reviews of ORETF Chemical Handler Exposure Studies; MRID 449722-01", DP Barcode D261948 of April 30, 2001. These studies used Dacthal as a surrogate compound with a target application rate of 2.0 lb/ai acre. These studies were conducted in accordance with current Agency guidelines and the data generated were of high quality. These studies have been reviewed by HED and Health Canada.

2.3 Occupational Handler Exposure and Risk Estimates

Calculation Methodology and Equations

Daily inhalation doses and Margins of Exposure (MOEs) were calculated using standard HED methodology as described in Appendix A. The target MOE is 100 for short/intermediate/long term exposure. Scenarios with an MOE less than the target MOE indicate a risk of concern for the occupational population.

Results and Comparison to Target MOE

The MOEs for occupational handlers are summarized in Table 7 and a detailed listing is included in Appendix B. All of the MOEs exceed the target MOE of 100 with baseline PPE which means that the risks are not of concern and respiratory protection is not needed.

Table 7 – MCPP-p Inhalation MOEs for Occupational Handlers

Exposure Scenario	Use Site	Application Rate	Daily Amount Treated or Applied	PPE Level[1]	MOE
Mixer/Loader (M/L)					
M/L WP for Turfgun Application (20 PCOs)	PCO Turf[2]	1.2 lb ae/acre	100 acres	Baseline	475
M/L WP for Groundboom	Golf Courses	1.2 lb ae/acre	40 acres	Baseline	1,200
M/L DF for Turfgun (20 PCOs)	PCO Turf	1.2 lb ae/acre	100 acres	Baseline	27,000
M/L DF for Groundboom	Golf Courses	1.2 lb ae/acre	40 acres	Baseline	66,000
M/L Liquids for Turfgun (20 PCOs)	PCO Turf	1.2 lb ae/acre	100 acres	Baseline	17,000
M/L Liquids for Groundboom	Sod Farms	1.2 lb ae/acre	80 acres	Baseline	21,000
M/L Liquids for Groundboom	Golf Courses	1.2 lb ae/acre	40 acres	Baseline	43,000
M/L Liquids for ROW Sprayer	Non Turf Areas[3]	0.0184 lb ae/gallon	1000 gallons	Baseline	110,000
Load Granulars for Broadcast Spreader	Golf Courses	1.2 lb ae/acre	40 acres	Baseline	30,000
Applicator					
Groundboom Application	Sod Farms	1.2 lb ae/acre	80 acres	Baseline	35,000
Groundboom Application	Golf Courses	1.2 lb ae/acre	40 acres	Baseline	69,000
ROW Sprayer Application	Non Turf Areas	0.0184 lb ae/gallon	1000 gallons	Baseline	34,000
Turfgun Application	PCO Turf	1.2 lb ae/acre	5 acres	Baseline	410,000
Broadcast Spreader Application	Golf Courses	1.2 lb ae/acre	40 acres	Baseline	43,000
Mixer/Loader/Applicator (M/L/A)					
M/L/A Wettable Powder with Turfgun	PCO Turf	1.2 lb ae/acre	5 acres	Baseline	6,600
M/L/A DF with Turfgun	PCO Turf	1.2 lb ae/acre	5 acres	Baseline	190,000
M/L/A Liquid Flowables with Turfgun	PCO Turf	1.2 lb ae/acre	5 acres	Baseline	210,000
M/L/A Liquids with Backpack Sprayer	Non Turf Areas	0.038 lb ae/gallon	40 gallons	Baseline	54,000
M/L/A Granules with Push Cyclone	PCO Turf	1.2 lb ae/acre	5 acres	Baseline	54,000

1. Baseline PPE indicates no respirator use is assumed.
2. PCO Turf - residential lawns, commercial lawns and other lawn areas treated by a Pest Control Operator (PCO).
3. Non Turf Areas - woody plant control on roadsides, rights-of-way and other similar non-crop areas.

2.4 Occupational Handler Risk Characterization

Only a few MCPP-p products are formulated as wettable powders and most of these products are packaged in water soluble bags that are used on turf. Many of the labels require waterproof gloves instead of chemical resistant gloves. It is not known if these gloves provide adequate protection.

3.0 Occupational Post Application Exposure and Risks

Occupational post application dermal risks were not assessed because a POD for dermal exposures was not selected for reasons given in Section 1.2. Occupational post application inhalation exposures are not anticipated because MCPP-p has a low vapor pressure (1.4e-05 mm Hg at 25° C) and because it is applied outdoors as a coarse spray. The Restricted Entry Interval for MCPP-p is 48 hours because it is a severe eye irritant (i.e. Toxicity Category I).

4.0 Residential Handler Exposures and Risks

According to the EPA Pesticide Sales and Usage Report for 2000/2001, MCPP-p is ranked number five among the ten most commonly used conventional pesticide active ingredients in the home and garden market sector. The residential products are typically formulated as dry weed and feed products or as liquids in concentrates or ready-to-use sprays. Many of these formulations include other phenoxy herbicides such as 2,4-D. Spot and broadcast treatments are both included on the labels. Exposures are expected to be short term in duration for broadcast treatments because the label allows only two broadcast treatments per year. Exposures are also expected to be short term in duration for spot treatments because the labels recommend repeat applications in two to three weeks for hard to kill weeds.

4.1 Residential Handler Scenarios, Data Sources and Assumptions

Scenarios

The following scenarios were assessed.

1. Hand Application of Granules
2. Apply Jet Spray Spot Weed Killer (Aerosol Can)
3. Belly Grinder Application
4. Load/Apply Granules with a Broadcast Spreader
5. Mix/Load/Apply with a Hose-end Sprayer (Mix-your-own)
6. Mix/Load/Apply with a Hose-end Sprayer (Ready-to-Use)
7. Mix/Load/Apply with Hand Held Pump Sprayer
8. Mix/Load/Apply with Ready-to-Use Sprayer

Data Sources

Exposure data for scenarios #1, #2 and #3 were taken from PHED. Exposure data for scenarios #4, #5 and #6 were taken from the residential portion of MRID 449722-01 which is the ORETF Handler Study (this study was discussed in Section 2.2). Exposure data for scenarios #7

and #8 were taken from MRID 444598-01, which belongs to the ORETF. This study involved low pressure handwand and RTU trigger sprayer application of carbaryl to home vegetable plants. Details of this study are included in Appendix C.

Assumptions Regarding Residential Applicators

- Broadcast spreaders and hose end sprayers would be used for broadcast treatments and the other application methods would be used for spot treatments only.
- The application rate of 1.2 lb ac/acre is from MCPP-p Use Closure Memo.
- The application rate of 0.0019 lb ae/can is from the Jet Spray label #228-190.
- One can would be used per day for Jet Spray applications.
- An area of 0.023 acre (1000 square feet) would be treated per application during spot treatments and an area of 0.5 acre would be treated during broadcast applications.

4.2 Residential Handler Exposure and Risk Estimates

The MOE calculations are included in Appendix C and a summary is included in Table 8. The MOEs exceed the target MOE of 100 and the risks are below EPA's level of concern.

Table 8 - MCPP-p Short Term MOEs for Homeowner Applications to Lawns

Scenario	Application Rate	Area Treated or Amount Applied	Inhalation Dose (mg/kg/day)	Inhalation MOE[A]
1. Hand Application of Granules (spot treatment)	1.2 lb ae/acre	0.023 acre/day	1.8E-04	190,000
2. Apply Jet Spray Spot Weed Killer (Aerosol Can)	0.0019 lb ae/can	1 can/day	3.5E-05	1,000,000
3. Belly Grinder Application (spot treatment)	1.2 lb ae/acre	0.023 acre/day	2.4E-05	1,400,000
4. Load/Apply Granules with a Broadcast Spreader	1.2 lb ae/acre	0.5 acre/day	7.8E-06	4,500,000
5. Mix/Load/Apply with a Hose-end Sprayer (Mix-your-own)	1.2 lb ae/acre	0.5 acre/day	1.4E-04	260,000
6. Mix/Load/Apply with a Hose-end Sprayer (Ready-to-Use)	1.2 lb ae/acre	0.5 acre/day	9.4E-05	370,000
7. Mix/Load/Apply with Hand Held Pump Sprayer	1.2 lb ae/acre	0.023 acre/day	3.5E-06	9,900,000
8. Mix/Load/Apply with Ready-to-Use Sprayer	1.2 lb ae/acre	0.023 acre/day	2.6E-05	1,300,000

4.3 Residential Handler Risk Characterization

The MOEs greatly exceed the target MOE of 100; therefore, these risks are of no concern.

5.0 Residential Turf Post Application Exposure and Risks

5.1 Residential Turf Post Application Exposure Scenarios, Data Sources and Assumptions

Scenarios

The following exposure scenario was assessed for residential turf post application risks:

Short Term Incidental Oral Exposures of Toddlers Playing on Treated Turf

Data Sources:

There are three turf transferable residue studies (MRID 446557-02, 446557-03 and 450331-01) that were submitted by the Broadleaf Turf Herbicide TFR Task Force. The field portions of the studies were conducted by Grayson Research LLC of Creedmoor, North Carolina, AGSTAT of Verona, Wisconsin, and Research for Hire of Porterville, California. The laboratory analysis for all three studies was conducted by Covance Laboratories of Madison, Wisconsin. These studies measured the dissipation of several phenoxy herbicides, including MCPP-p, using the ORETF roller technique (also called the modified California Roller). All three studies were reviewed by HED and were found to meet the Series 875 guideline requirements for postapplication exposure monitoring. The studies are summarized on the following pages and the data analyses are included in Appendix D.

Determination of Transferable Turf Residues on Turf Treated with 2,4-D, 2,4-DP-p, MCPP-p and Dicamba, MRID 446557-02 (Phase 1 - Effect of Form)

The purpose of this study was to assess the effects of different forms upon the day zero turf transferable residues (TTR) and dissipation rates of phenoxy herbicides including MCPP-p. MCPP-p was applied either alone or with 2,4-D and dicamba or with MCPA and 2,4-DP-p. The applications were made to turf plots in North Carolina using a groundboom sprayer. The plots were mowed to a height of two inches prior to the application and were not mowed again until after the seventh day of sampling. No irrigation was performed. Significant rainfall (i.e. greater than 0.05 inches) did not occur until Day After Treatment (DAT) 10 when 0.17 inches occurred prior to the DAT 10 sample.

Samples were collected after the sprays had dried and at 0.5, 1, 2, 3, 4, 5, 6, 7, 10 and 14 days after treatment (DAT). The samples were analyzed using a validated method that had an LOQ of 0.879 ng/cm^2. The concurrent laboratory recoveries were close to 100 percent and were acceptable. The average field recoveries were acceptable with a range of 68.9 to 102 percent depending upon the treatment, the date of fortification and the fortification level. The TTR values were corrected using a field recovery factor of 0.832 for MCPP-p alone, 0.0816 for MCPP-p in Treatment #9 and 0.861 for MCPP-p in Treatment #10.

The results of the Phase 1 samples are shown in Table 9. The highest TTR levels occurred on DAT 0.5. The TTR levels declined to the LOQ by DAT 2 or 3.

Table 9 - Dissipation of MCPP-p Applied to Turf Using Various Forms (Phase 1)					
MCPP-p Form	**Application Rate (lb ae/acre)**	**Maximum TTR (ug/cm^2)**	**Percent Applied as TTR**	**Correlation Coefficient**	**Half Life (days)**
MCPP-P DMA	0.60	0.11+0.019 (n=3)	1.7	0.95 (n=15)	0.37
MCPP-p Treatment #9	0.60	0.10 ± 0.023 (n=3)	1.6	0.90 (n=12)	0.28
MCPP-p Treatment #10	0.20	0.12 ± 0.065 (n=3)	1.8	0.95 (n=12)	0.36
Treatment #9 contained 2,4-D DMA, MCPP-p DMA and Dicamba DMA. Treatment #10 contained MCPA DMA, MCPP-p DMA and 2,4-DP-p DMA.					

Determination of Transferable Turf Residues on Turf Treated with 2,4-D DMA + MCPP-p DMA + Dicamba DMA in Various Spray Volumes, - MRID 446557-03
(Phase 2 - Effect of Spray Volume)

The purpose of this study was to assess the effects of different spray volumes upon the day zero TTRs and dissipation rates of phenoxy herbicides. In all cases, MCPP-p was applied in combination with 2,4-D DMA and dicamba DMA All of the applications were made to cool season fescue/blue grass turf plots in North Carolina using a groundboom sprayer. The plots were mowed to a height of two inches prior to the application and were not mowed again until after the seventh day of sampling. No irrigation was performed. No rain occurred on DAT 0 or DAT 1 and 0.17 inches of rain occurred prior to the DAT 2 sample, 0.46 inches occurred prior to the DAT 3 sample and 0.03 inches occurred prior to the DAT 4 and 5 samples.

Samples were collected at 3 and 12 hours after treatment (HAT) and at 1, 2, 3, 4, 5, 6, 7, 10 and 14 days after treatment (DAT). The samples were analyzed using Method 2 as described and validated in MRID 446557-04 and the LOQ was 0.879 ng/cm^2. The overall concurrent laboratory recovery was 93.0 ± 10.2 percent (n=28) and ranged from 105 ± 7.2 percent (N=8) at the lowest fortification levels (1 to 2X LOQ) to 85.8 ± 8.0 percent (N=3) at the highest fortification levels (100 to 400X LOQ). Field recovery samples were prepared at DAT 0 and DAT 6 using fortification levels of 0.004 and 0.04 ug/cm^2. The average recoveries for each subset of field spikes (n=6) ranged from 88.5 to 94.3 percent depending upon the fortification level and date of preparation. The raw data were corrected for field recovery by using a factor of 0.885 based upon the average recovery for the samples fortified at 0.04 ug/cm^2.

A summary of the results are shown in Table 10. The half lives ranged from 0.26 to 0.31 days and were calculated based upon the first two days of dissipation because the TTRs reached the LOQ by DAT 2.

Table 10 - Dissipation of MCPP-p Applied to Turf at Various Spray Volumes (Phase 2)					
Spray Volume (GA/acre)	Application Rate (lb ae/acre)	Maximum TTR[1] (ug/cm^2)	Percent Applied as TTR	Correlation Coefficient	Half Life (days)
2	0.66	0.078 ± 0.054 (n=3)	1.1	0.84 (n=12)	0.31
5	0.66	0.090 ± 0.021 (n=3)	1.2	0.96 (n=12)	0.26
20	0.66	0.051 ± 0.010 (n=3)	0.7	0.97 (n=12)	0.28
1. The maximum average TTR occurred on DAT 1.0, DAT 0.0 and DAT 0.5 for the 2, 5 and 20 GPA applications, respectively.					

Determination of Transferable Turf Residues on Turf Treated with 2,4-D DMA + MCPP-p DMA + MCPP-p DMA MRID 450331-01 (Two Additional Sites)

The purpose of this study was to assess the effects of two additional sites upon the day zero TTRs and dissipation rates of phenoxy herbicides. MCPP-p was applied in combination with either 2,4-D and Dicamba (Treatment #4) or MCPA and 2,4-DP-p (Treatment #5). The applications were made to turf plots in Wisconsin and California using groundboom sprayers with a spray volume of 9.4 to 9.9 gallons per acre. The plots were mowed to a height of two inches prior to the application and were not mowed again until after the seventh day of sampling. No irrigation was performed. No rain occurred at the California site; however, the grass was wet with dew during the DAT 0.5 sampling which occurred at night. The following rainfall occurred at the Wisconsin site: 0.025 inches prior to the HAT 8 sample, 0.145 inches prior to the HAT 12 sample and 0.19 inches prior to the HAT 24 sample.

Samples were collected at 1, 4, 8, 12 and 24 HAT and 2, 3, 4 and 7 DAT. The samples were analyzed using a validated method and the LOQ was 0.879 ng/cm^2. The concurrent laboratory recoveries were acceptable for both sites. Field recovery samples were prepared in the same manner as for Phase 1 with the exception that a different fortification solution was used. In Phase 1, the fortification solution contained only acetone as the solvent, while in this study 0.1 M phosphoric acid was added to the acetone. The recoveries obtained were very low and were not reported. These low recoveries were thought to be the result of interference caused by the acid interaction with the cotton during storage The recoveries from phase 1 were instead used as a surrogate.

The results of this study are shown in Table 11. The TTR values declined to the LOQ by DAT 1 in Wisconsin and to 1-2X the LOQ by DAT 7 in California. The data for DAT 0.5 at the California site are not included because these samples were collected at night when there was dew. The maximum TTR value of 6.6 percent, which occurred at the Wisconsin site treated with Treatment 5, also appeared to be an outlier, but no explanation could be found in the study report and therefore, this data was not excluded.

Table 11 - Dissipation of MCPP-p Applied to Turf at Sites in California and Wisconsin

Site - Treatment[1]	Application Rate (lb ae/acre)	Maximum TTR[2] (ug/cm^2)	Percent Applied as TTR	Correlation Coefficient	Half Life (days)
CA-4	0.62	0.074 ± 0.0085 (n=3)	1.1	0.97(n=24)	1.1
CA-5	0.77	0.15 ± 0.020 (n=3)	1.7	0.92(n=24)	1.2
WI-4	0.61	0.060 ± 0.0081 (n=3)	0.9	N/A	N/A
WI-5	0.77	0.57 ± 0.41 (n=3)	6.6	N/A	N/A

1. Treatment 4 consisted of 2,4-D DMA, MCPP-p DMA and Dicamba DMA
1. Treatment 5 consisted of MCPA DMA, MCPP-p DMA and 2,4-DP-p DMA
2. The maximum TTR occurred on HAT 1 for CA-4, CA-5 and WI-4. The maximum TTR occurred on HAT 8 for WI-5.

Application of the TTR Data

Because TTR data only apply to dermal exposures and a dermal assessment is not needed for MCPP-p, the TTR data were not directly used in this assessment. The TTR data do indicate the rate of dissipation, however, and were used for risk characterization.

General Assumptions

The following general assumptions are taken from the Standard Operating Procedure (SOPs) of December 18, 1997 and ExpoSAC Policy #12 "Recommended Revisions to the Standard Operating Procedures for Residential Exposure Assessments of February 22, 2001."

- An assumed initial TTR value of 5% of the application rate is used for assessing hand-to-mouth exposures.
- An assumed initial TTR value of 20% of the application rate is used for assessing object-to-mouth exposures.
- Soil residues are contained in the top centimeter and soil density is 0.67 mL/gram.
- Three year old toddlers are expected to weigh 15 kg.
- Hand-to-mouth exposures are based on a frequency of 20 events/hour and a surface area per event of 20 cm^2 representing the palmar surfaces of three fingers.
- Saliva extraction efficiency is 50 percent meaning that every time the hand goes in the mouth approximately ½ of the residues on the hand are removed.
- An exposure duration of 2 hours per day is assumed for toddlers playing on turf.

Assumptions Specific to MCPP-p

The following assumptions that are specific to MCPP-p are used for assessing residential post application exposures.

- The application rate of 1.2 lb ae/acre as stated in the Use Closure Memo was used.

- Exposures are primarily short term in duration because MCPP-p is applied only two times per year, it degrades rapidly in the environmental with a half life of 1.2 days as shown by the TTR studies and it is rapidly eliminated from the body as shown in the metabolism studies. Intermediate exposures are less likely and long term exposures are highly unlikely.

Calculation Methods

The above factors were used in the standard SOP formulas to calculate the incidental oral exposures from hand-to-mouth, object-to-mouth and soil ingestion on treated turf. These formulas are described in Appendix A. The MOEs were calculated using the short/intermediate term incidental oral POD which has a NOAEL of 35 mg/kg/day.

5.2 Residential Turf Post Application Exposure and Risk Estimates

The MOEs are summarized in Table 12 and the detailed calculations are included in Appendix F. All of the MOEs exceed the target MOE of 100. This means that the risks are below EPA's level of concern.

Table 12 - MCPP-p MOEs for Residential Post Application Turf Exposures
(Application Rate = 1.2 lb ae/acre)

Toddler Exposure Scenario	TTR and soil Residue Levels	Dose (mg/kg/day)	MOE
Hand-to-Mouth Ingestion	0.67 ug/cm^2	0.018	1,900
Object-to-Mouth Ingestion	2.7 ug/cm^2	0.0045	7,800
Soil Ingestion	9.0 ppm	0.00006	580,000
Total of Above		0.023	1,600

5.3 Residential Turf Post Application Risk Characterization

The risk assessment for residential turf post application exposures is conservative because it is based on day zero assumed TTRs and soil residues and does not account for dissipation. The actual TTR data indicated that dissipation was fairly rapid with a maximum half life of 1.2 days. In addition, the POD is based on a number of general effects including decreased body weight, decreased adrenal weight, increased liver enzyme, increased liver weight and increased kidney weight. These effects probably do not occur until after several days repeated exposure.

6.0 Residential Turf Granule Ingestion Exposure and Risks

Scenarios

The following exposure scenario was assessed:

Acute Exposures of Toddlers from Incidental Oral Ingestion of Granules

Assumptions

The following assumptions were used to assess the risk of incidental oral ingestion of granules:

- The assumed ingestion rate is 0.3 g/day based on the Residential SOP 2.3.1. This is based on the assumption that if 150 lb of product were applied to a ½ acre lawn, the amount of product per square foot would be 3 g/ft^2 and a child would consume one-tenth of the product available in a square foot.
- Three year old toddlers are expected to weigh 15 kg.
- The granules contain a maximum of 0.69 percent MCPP-p ae based upon product #538-175. The other granule products contain 0.08 to 0.61 percent MCPP-p ae.

Calculation Methods and Risks

The above factors were used to calculate the potential dose rate and the absorbed dose using the Residential SOP 2.3.1 formulas as shown in Table 13. MOEs were then calculated using the acute dietary NOAEL of 175 mg/kg/day and they exceed the target MOE of 100. This means that the risks for toddler exposures from granular ingestion are below EPA's level of concern.

Table 13 - Granule Ingestion Risks for MCPP-p

Percent ae	Potential Dose Rate[1] (mg/day)	Absorbed Dose[2] (mg/kg/day)	Acute MOE[3]
0.69	2.1	0.14	1300

1. Potential Dose Rate (PDR) = 0.3 g/day * (Percent ai/100)* 1000 mg/g
2. Absorbed Dose = PDR/BW
3. MOE = NOAEL/Dose where the NOAEL = 175 mg/kg/day

7.0 References

MCPP-p Smart Meeting, January 10, 2006, MCPP-p Task Force.

MRID 446557-02 "Determination of Transferable Turf Residues on Turf Treated with 2,4-D, 2,4-DP-p, MCPP-p and Dicamba", William P. Barney, Grayson Research , September 4, 1998 (Sponsored by the Broadleaf Turf Herbicide TRF Task Force)

MRID 446557-03 "Determination of Transferable Turf Residues on Turf Treated with 2,4-D DMA + MCPP-p DMA + Dicamba DMA in Various Spray Volumes", William P. Barney, Grayson Research , September 4, 1998 (Sponsored by the Broadleaf Turf Herbicide TRF Task Force)

MRID 450331-01 "Determination of Transferable Turf Residues on Turf Treated with 2,4-D DMA, MCPA DMA, 2,4-D DMA + MCPP-p DMA + Dicamba DMA and MCPA DMA + MCPP-p DMA + 2,4-DP-p DMA", Donald Hughes, Covance Laboratories, January 27, 2000 (Sponsored by the Broadleaf Turf Herbicide TRF Task Force)

U.S. EPA, February 10, 1998 Draft Standard Operating Procedures for Residential Exposure Assessments. U.S. Environmental Protection Agency, Office of Pesticide Programs.

U.S. EPA, 1998. PHED Surrogate Exposure Guide, V1.1. U.S. Environmental Protection Agency, Office of Pesticide Programs, August 1998.

U.S. EPA, 1999 "Exposure Data Requirement for Assessing Risks from Pesticide Exposure of Children", SAP Meeting of March 8, 1999, page 60.

U.S. EPA, 1999, "Use of Values from the PHED Surrogate Table and Chemical-Specific Data." Science Advisory Council for Exposure, Policy.007, U.S. Environmental Protection Agency, Office of Pesticide Programs.

U.S. EPA, August 7, 2000, "Agricultural Default Transfer Coefficients" Science Advisory Council for Exposure. SOP 003.1, .U.S. Environmental Protection Agency, Office of Pesticide Programs.

U.S. EPA, July 5, 2000, "Standard Values for Daily Acres Treated in Agriculture" HED Science Advisory Council for Exposure, Policy.009, U.S. Environmental Protection Agency, Office of Pesticide Programs.

U.S. EPA, 2006 "Updated Use Closure Memorandum for Mecoprop (MCPP-p) and its Related Salts, Case 0377" Special Review and Reregistration Division, U.S. Environmental Protection Agency, Office of Pesticide Programs, October, 4, 2006.

8.0 Glossary of Terms Used in Occupational/Residential Exposure Assessment

TERM	DEFINITION
AE - Acid Equivalent	The weight of MCPP-p excluding the weight of the ester or salt groups.
Baseline PPE	Includes long pants, long sleeved shirt, shoes, socks and no gloves or respirator
Dose	The amount of pesticide that is absorbed into the body.
Double Layer PPE	Includes coveralls over single layer PPE
ExpoSac - Scientific Advisory Committee for Exposure	A committee within the EPA Health Effects Division that reviews pesticide exposure assessments and develops policy.
Exposure	The amount of pesticide that impinges upon the skin or is inhaled.
Handler/Applicator	A worker who mixes, loads and/or applies pesticides
HAT	Hours after treatment
Intermediate Term	31 days to six months
Level of Concern (LOC)	The MOE which is equal to the uncertainty factor level of concern. MOEs that are less than the LOC indicate risks of concern that may require additional evaluation and refinement.
MOE - Margin of Exposure	The ratio of the "safe" dose (usually the NOAEL) divided by the estimated exposure. Formerly called the Margin of Safety.
NOAEL	No Observed Adverse Effect Level
ORETF	Outdoor Residential Exposure Task Force
PHED	Pesticide Handlers Exposure Database
Re-entry Worker	One who works in fields that have been treated with pesticides
REI - Restricted Entry Interval	The period of time that must pass following pesticide application before workers are allowed to re-enter the treated area.
ROW – Rights-of-Way	Areas such as roadsides, powerlines, railway rights-of-way and pipelines.
Short Term	One to thirty days
Single Layer PPE	Includes baseline PPE with chemical resistant gloves
Target MOE	The MOE which is equal to the uncertainty factor level of concern. MOEs that are less than the target MOE indicate risks of concern that may require additional evaluation and refinement.

APPENDIX A

STANDARD FORMULAS USED FOR CALCULATING OCCUPATIONAL AND RESIDENTIAL EXPOSURES TO MCPP-p

A. Introduction

This document is a summary of the formulas used to calculate occupational and residential exposures to MCPP-p. These formulas and a basic description of how they are used were taken from References A through F. These references also contain more detailed information on the rationale behind these formulas. Only those formulas that are pertinent to MCPP-p exposures are discussed in this document.

B. Occupational Handler/Applicator Exposures

The basic rationale for these formulas is that the daily exposure is the product of the amount of active ingredient (a.i.) handled per day times a unit exposure value. The amount of ai handled per day is the product of the application rate times the area treated. For example, if 1.2 lb/acre of MCPP-p were applied to 80 acres in one day, the amount of MCPP-p handled that day would be 96 lb. The unit exposure value is the amount of exposure that results from handling a given amount of active ingredient by a certain method while using certain PPE. For example, the inhalation unit exposure value for open mixing and loading of liquids is 1.2 ug per pound of ai handled. In this example, the daily exposure would be 96 lb ai handled times 1.2 ug unit exposure per pound of ai handled which equals 115 ug per day. The daily absorbed dose (mg/kg BW) is calculated from the exposure by converting the exposure from ug into mg, multiplying the exposures times an absorption factor (usually 1.0 for inhalation) and dividing the result by the body weight (70 kg). In this example the daily dose is (115 ug/day * 0.001 mg/ug *1.0)/70 kg which equals 0.0016 mg/kg/day.

Daily inhalation exposure is calculated:

Daily inhalation exposure = [Unit exposure x Application rate x Area Treated] / Conversion Factor
(mg/kg/day) (1 mg/1000 ug)

Where:

Unit exposure	=	(ug/lb ai handled) derived from PHED or ORETF Study Data
Application rate	=	lb ai per acre or gallon of spray solution; and
Daily treatment	=	acres or gallons applied per day).

Absorbed Daily Dose is calculated:

Absorbed daily inhalation dose = (Daily inhalation exposure x absorption factor) / body weight
(mg/kg/day) (mg/day) (unitless) (kg)

[Note: an absorption factor of 1.0 was used for inhalation exposures.]

Once the absorbed daily doses are calculated, the Margins of Exposure (MOEs) can be calculated as shown below:

Margin of Exposure is calculated:

MOE (unitless) = NOAEL (mg/kg/day) / Dose (mg/kg/day)

The target MOE is 100 for occupational handlers. Scenarios with MOEs greater than the target MOEs are below the Agency's level of concern.

C. Residential Handler Exposures

Residential handler exposures are calculated in the same manner as described above for occupational handlers; however, there are a few differences in the assumptions used. These differences are described in References B and C and include the following:

*PPE such as respirators are not worn.
*The areas treated are much smaller.

D. Residential Post Application Exposure on Treated Turf

The *SOPs For Residential Exposure Assessment (Reference B)* define three incidental oral pathways that apply to post application toddler exposure on treated turf. The SOPs and the associated pathways are presented below:

- ***Dose from hand-to-mouth activity from treated turf calculated using SOP 2.3.2:***
  Residues ingested from a child touching turf and then putting their hands in their mouth.

- ***Dose from object-to-mouth activity from treated turf calculated using SOP 2.3.3:***
  Residues ingested from a child mouthing a handful of treated turf; and

- ***Dose from soil ingestion activity from treated turf calculated using SOP 2.3.4:***
  Residues from a child touching treated soil and then putting their hands in their mouth.

The algorithms used for each type of dose calculation are presented on the following pages.

Exposures from Hand to Mouth Behavior on Treated Turf:

The following formula is used to calculate the incidental oral ingestion exposures from to hand-to-mouth behavior on treated turf (SOP 2.3.2).

$$PDR = TTR * (SE/100) * SA * Freq * Hours * (1\ mg/1000\ ug)$$

where:

PDR	=	potential dose rate from hand-to-mouth activity (mg/day);
TTR	=	Turf Transferable Residue ($\mu g/cm^2$);
SE	=	saliva extraction factor (50%);
SA	=	surface area of the hands (20 cm^2);
Freq	=	frequency of hand-to-mouth events (20 events/hour); and
Hours	=	exposure duration (2 hours).

When used for hand to mouth exposures, the TTR value is based upon the default assumption of 5 percent of the application rate and not the TTR study because the TTR studies do not account for "the sticky hand effect" as discussed in Reference C.

The formula for calculating the TTR value is given below:

TTR = Application Rate * F * CF1 * CF2 * CF3

Where:

Application Rate	=	lb ai/acre
F	=	fraction of applied ai that is available for hand to mouth exposure (5 percent)
CF1	=	1.0 lb ai/acre equals 2.3 x 10^{-5} lb ai per ft^2
CF2	=	4.54 x 10^8 ug/lb
CF3	=	0.00108 ft^2/cm^2

Note: CF1 * CF2 * CF3 = 11.23

Exposures from Object to Mouth Behaviors on Treated Turf

The following formula is used to calculate exposures from object-to-mouth behavior on treated turf that is represented by a child mouthing on a handful of turf (SOP 2.3.3):

$$PDR = TTR * IGR * (1mg/1000ug)$$

where:

PDR	=	potential dose rate from mouthing activity (mg/day);
TTR	=	Turf Transferable Residue where dissipation is based on TTR study and the 0-day value is based on the 20% initial transferability factor ($\mu g/cm^2$); and
IgR	=	ingestion rate for mouthing of grass per day (25 cm^2/day).

When used for object to mouth exposures, the TTR value is based upon the default assumption of 20 percent of the application rate and not the TTR study because the TTR studies do not account for "saliva washing effect" as discussed in Reference C.

Exposures from Soil Ingestion on Treated Turf

The following formula is used to calculate exposures from soil ingestion (SOP 2.3.4):

PDR = SR * IgR * (0.000001 gm/ 1 ug)

Where:
PDR = dose from soil ingestion activity (mg/day)
SR = Soil Residue where dissipation is based on TTR study and the 0-day value is based on the application rate, 1 cm depth of surface soil, and the density of soil ($\mu g/cm^3$)
IgR = ingestion rate for daily soil ingestion (mg/day)

MOE Calculations for Each Pathway

The MOEs are calculated for each individual pathway using the MOE formula:

MOE = NOAEL (mg/kg/day / Dose (mg/kg/day)

MOEs Calculations for All of the Pathways Combined

The dose from each incidental oral pathway was combined into a total dose as shown below.

Total Dose = (Hand-to Mouth Dose + Object to Mouth Dose + Soil Ingestion Dose)

The total dose is then used to calculate an MOE as shown above. The target MOE is 100.

References

(A) PHED Surrogate Exposure Guide, V1.1. Health Effects Division, Office of Pesticide Program. August, 1998.

(B) Standard Operating Procedures for Residential Exposure Assessments. U.S. EPA. December 18, 1997.

(C) ExpoSAC SOP #12 "Recommended Revisions to the Standard Operating Procedures (SOPs) for Residential Exposure Assessments. February 22, 2001

(D) Series 875 - Occupational and Residential Exposure Test Guidelines, Group B - Post Application Exposure Monitoring Test Guidelines. U.S. EPA. February 10, 1998.

(E) Overview of Issues Related to the Standard Operating Procedures for Residential Exposure Assessment, Presented to the FIFRA Scientific Advisory Panel on September 1999

Appendix B: Occupational Handler Exposure Data and Risk Calculations for MCPP-p

Table B1 – MCPP-p Formulations Used, Application Methods, Application Rates and Daily Amounts Treated				
Application Method	**Use Sites**	**Formulations Used** **WP = Wettable Powder** **WDG = Water Dispersible Granule**	**Application Rate[2]** **(lb ae/acre or lb ae/ga)**	**Daily Amount Treated or Applied[3]**
Groundboom Spray	Sod Farm Turf Golf Course Turf	Liquid Liquid, WP , WDG	1.2 lb ae/acre 1.2 lb ae/acre	80 acres/day 40 acres/day
Backpack Sprayer (Mix/Load/Apply)	Non-Turf Areas[1]	Liquid	0.038 lb ae/ga[4]	40 ga/day
Right of Way Sprayer	Non-Turf Areas[1]	Liquid	0.0184 lb ae/ga[5]	1000 ga/day
Broadcast Application of Granules	Golf Courses	Granular	1.2 lb ae/acre	40 acres/day
Turfgun (Applicator) Turfgun (Mixer Loader)	Turf Turf	Liquid, WDG, WP Liquid, WDG, WP	1.2 lb ae/acre 1.2 lb ae/acre	5 acres/day 100 acres/day[6]
Push Cyclone Spreader	Turf	Granular	1.2 lb ae/acre	5 acres/day

Notes

1. Roadsides (aprons and guardrails), rights of way and other similar non-crop areas.
2. Except as noted, application rates are from the Use Closure Memo of 10/4/2006.
3. Except as noted, these values are from ExpoSAC Policy 9 "Standard Values for Daily Acres Treated in Agriculture", Revised 7/5/2000.
4. Derived from page 6 of label 228-410 based on the use directions for small (spot) applications with small tank sprayers.
5. Derived from page 7 of label 228-410 based on the use directions for control of woody plants.
6. Based upon a mixer loader at a central location supporting a PCO crew of 20 applicators.

Table B2 - Exposure Data Used for MCPP-p Occupational Handler/Applicator Risk Assessment

Exposure Scenarios (See notes for PPE Descriptions)	Baseline Dermal (mg/lb ae)	Baseline Inhalation (ug/lb ae)	Single Layer Dermal (mg/lb ae)	Double Layer Dermal (mg/lb ae)	PF5 Respirator Inhalation (ug/lb ae)	PF10 Respirator Inhalation (ug/lb ae)	Engineering Control Dermal (mg/lb ae)	Engineering Control Inhalation (ug/lb ae)
Mixer Loader Unit Exposure Values								
Mix Load Wettable Powder (WP) Formulations	3.7	43	0.17	0.13	8.6	4.3	0.0098	0.24
Mix Load Dry Flowable (DF) Formulations	0.066	0.77	0.066	0.047	0.15	0.077	N A	N A
Mix Load Liquid Formulations	2.9	1.2	0.023	0.017	0.24	0.12	0.0086	0.083
Load Granular Formulations	0.0084	1.7	0.0069	0.0034	0.34	0.17	0.00017	0.034
Applicator Unit Exposure Values								
Groundboom Application	0.014	0.74	0.014	0.011	0.15	0.074	0.005	0.043
Right of Way (ROW) Application	1.3	3.9	6.1	ND	10.8	5.4	NA	NA
Turf Gun Application	No Data	1.0	0.73	0.40	0.20	0.10	NA	NA
Broadcast Spreader Application	0.0099	1.2	0.0072	0.0042	0.24	0.12	0.0021	0.22
Mixer/Loader/Applicator Unit Exposure Values								
Mix Load Apply WP with a Turfgun	No Data	62	0.74	0.4	12.4	6.2	0.65	7.7
Mix Load Apply Liquid Flowables with a Turfgun	No Data	1.9	0.5	0.27	0.38	0.19	Not Feasible	Not Feasible
Mix Load Apply WD Granules with a Turfgun	No Data	2.2	0.59	0.34	0.44	0.22	Not Feasible	Not Feasible
Mix Load Apply Liquids with Backpack Sprayer	No Data	30	2.5	1.6	6.0	3.0	Not Feasible	Not Feasible
Load Apply Granules with a Push Cyclone Spreader	0.35	7.5	0.22	0.11	1.5	0.75	Not Feasible	Not Feasible

Notes - PPE Descriptions

Baseline Dermal - includes long sleeve shirts, long pants, shoes and socks.
Single Layer Dermal - includes water resistant gloves over Baseline PPE
Double Layer Dermal - includes Tyvek or cotton coveralls over Single Layer PPE
PF5 Respirator Inhalation - filtering facepiece disposable respirator (i.e. dustmask) with a protection factor of 5
PF10 Respirator Inhalation - half face cartridge respirator with a protection factor of 10

Table B3: Sources of Exposure Data Used for MCPP-p Occupational Handler Exposure and Risk Calculations		
Exposure Scenario	**Data Source**	**Comments[2, 3]**
Mixer/Loader		
Mix Load Wettable Powder (WP) Formulations	PHED[1]	**Baseline:** Hands, dermal, and inhalation = ABC grades. Hands = 7 records; Dermal = 22 to 45 records, and Inhalation = 44 records. Low confidence in the dermal hands data due to the low number of hand records. Medium confidence in inhalation data. No protection factor was needed to define the unit exposure value. **PPE:** Hands = ABC grades. Hands = 24 records. The same dermal data are used as for baseline coupled with a 50% protection factor to account for an additional layer of clothing. Hands = ABC grades. Hands = 24 records. Medium confidence in hand data. A respirator protection factor of 5 is applied to estimate the use of a filtering facepiece disposable respirator (i.e. a dust mask). A respirator protection factor of 10 is applied to estimate the use of a half face elastomeric facepiece respirator with cartridges (i.e. half face respirator). **Engineering Controls**: Dermal = AB grade. Hand and inhalation = all grade. Hands = 9 records; dermal = 6 to 15 records; and inhalation = 15 records. Low confidence in the hand, dermal, and inhalation data. No protection factor was needed to define the unit exposure value. Engineering controls are water soluble packets.
Mix Load Dry Flowable (DF) Formulations	PHED	**Baseline:** Hand, inhalation, and dermal data = acceptable grades. Hands = 7 records; Dermal = 16 to 26 records; and Inhalation = 23 records. Low confidence in hand/dermal data because of number of hand records. Inhalation data are high confidence. No protection factor was needed to define the unit exposure value. **PPE:** Hands = acceptable grades. Hands = 21 records. High confidence in all dermal data. As appropriate, the same dermal and inhalation data were used as for the baseline coupled with a 50% protection factor to account for an additional layer of clothing. A respirator protection factor of 5 is applied to estimate the use of a dust mask. A respirator protection factor of 10 is applied to estimate the use of a half face respirator. **Engineering Controls: N/A**
Mix Load Liquid Formulations	PHED	**Baseline:** Hands, dermal, and inhalation = acceptable grades. Hands = 53 records; Dermal = 72 to 122 records; and Inhalation = 85 records. High confidence in hand, dermal, and inhalation data. No protection factor was needed to define the unit exposures. **PPE:** The same dermal data are used as for baseline coupled with a 50% protection factor to account for an additional layer of clothing. Hands = acceptable grades. Hands = 59 records. High confidence in hand data. A respirator protection factor of 5 is applied to estimate the use of a dust mask. A respirator protection factor of 10 is applied to estimate the use of a half-face respirator. **Engineering Controls:** Hands, dermal, and inhalation = acceptable grades. Hands = 31 records; Dermal = 16 to 22 records; and Inhalation = 27 records. High confidence in hand, dermal, and inhalation data.
Load Granules	PHED	**Baseline:** Dermal = 33 - 78 records, ABC grades. Hand = 10 records, All grade. Inhalation = 58 records, AB grade. Low confidence due to poor grade quality of hand records and low record number. High confidence in inhalation data. No protection factor was needed to define the unit exposure value. **Single Layer:** Dermal = 33 - 78 records, ABC grades. Gloved Hand = 45 records, AB grade. Medium confidence in dermal and hand data. **Double Layer:** Dermal = 12 - 59 records, ABC grades. Gloved Hand = 45 records, AB grade. Low confidence in dermal data due to low record number for many body parts. **Engineering Control**: The same hand, dermal and inhalation data are used as for baseline with a 98% protection factor to account for the use of engineering controls.

Table B3: Sources of Exposure Data Used for MCPP-p Occupational Handler Exposure and Risk Calculations		
Exposure Scenario	**Data Source**	**Comments[2, 3]**
Applicator		
Groundboom Application	PHED	**Baseline**: Hand, dermal, and inhalation = acceptable grades. Hands = 29 records, dermal = 23 to 42 records, and inhalation = 22 records. High confidence in hand, dermal, and inhalation data. No protection factors were needed to define the unit exposure values. **PPE:** The same dermal data are used as for baseline coupled with a 50% protection factor to account for an additional layer of clothing. Hands = ABC grades. Hands = 21 records. Medium confidence in hand data. A respirator protection factor of 5 is applied to estimate the use of a dust mask. A respirator protection factor of 10 is applied to estimate the use of a half-face respirator. **Engineering Controls**: Hand and dermal = ABC grade. Inhalation = acceptable grades. Hands = 16 records; dermal = 20 to 31 records; and inhalation = 16 records. Medium confidence in the hand and dermal data. High confidence in inhalation data. No protection factor needed to define the unit exposure value. Protective gloves not used.
Right-of-Way (ROW) Sprayer Application	PHED Right-of-Way Sprayer Data	**Baseline:** Hands = 16 records with ABC grade data, dermal = 4 to 20 records with ABC grade data, and inhalation = 16 records with AB grade data. Low confidence due to lack of dermal records. No protection factor was needed to define the unit exposure value. **PPE:** Hands = 4 records with AB grade data, dermal = 4 to 20 records with ABC grade data. The same dermal data are used as for baseline coupled with a 50% protection factor to account for an additional layer of clothing. Low confidence due to low number of dermal and hand records. A respirator protection factor of 5 is applied to estimate the use of a dust mask. A respirator protection factor of 10 is applied to estimate the use of a half-face respirator. **Engineering Controls:** No data is available.
Turfgun Application	ORETF OMA002	**Baseline:** No ungloved data **PPE**: Dermal and hands = B grade; Inhalation = B grade; Dermal = 10 records; hands = 10 records; and inhalation = 10 records. Medium confidence in inhalation, dermal, and hand data due to low number of records. A 50% protection factor to account for an additional layer of clothing. A respirator protection factor of 5 is applied to estimate the use of a dust mask. A respirator protection factor of 10 is applied to estimate the use of a half-face respirator. **Engineering Controls:** Not considered feasible for this exposure scenario.
Broadcast Spreader Application	PHED	**Baseline**: Dermal = 1-5 records, AB grades. Hand = 5 records, AB grade. Inhalation = 5 records, AB grade. Low confidence due to inadequate record number. **PPE:** The same dermal data are used as for baseline coupled with a 50% protection factor to account for an additional layer of clothing. The same hand are used as for baseline coupled with a 90% protection factor to account for the use of gloves. A respirator protection factor of 5 is applied to estimate the use of a dust mask. A respirator protection factor of 10 is applied to estimate the use of a half-face respirator. **Engineering Control:** Dermal = 2 - 30 records, AB grade. Hand = 17 records, AB grade. Neck data has only two records. Other body parts have 27 - 30 records. High Confidence except for neck data. Inhalation = 37 records, AB grade. High Confidence.
Mixer/Loader/Applicator (M/L/A)		
M/L/A WP with a Turfgun	ORETF OMA002	**Baseline:** No ungloved data **PPE**: Dermal and hands = B grade with 15 records; Inhalation = B grade with 15 records. High confidence in inhalation, dermal, and hand data. A 50% protection factor to account for an additional layer of clothing. A respirator protection factor of 5 is applied to estimate the use of a dust mask. A respirator protection factor of 10 is applied to estimate the use of a half-face respirator. **Engineering Controls:** Not considered feasible for this exposure scenario.

Table B3: Sources of Exposure Data Used for MCPP-p Occupational Handler Exposure and Risk Calculations		
Exposure Scenario	**Data Source**	**Comments[2, 3]**
M/L/A Liquids with a Turfgun	ORETF OMA002	Same as above for scenario 13. Liquid flowable formulations were used in 15 records of the ORETF study.
M/L/A DF with a Turfgun	ORETF OMA002	Same as above for scenario 13. The water dispersable granules were used in 15 records of the ORETF study.
M/L/A Liquids with a Backpack Sprayer	PHED	**Baseline:** No Data **PPE:** Hands = C grades. Hands = H records. Low confidence in hand data. The same dermal data are used as for baseline coupled with a 50% protection factor to account for an additional layer of clothing. A respirator protection factor of 5 is applied to estimate the use of a dust mask. A respirator protection factor of 10 is applied to estimate the use of a half-face respirator. **Engineering Controls:** Not considered feasible for this exposure scenario.
Load/Apply Granules with a Push Cyclone Spreader	ORETF OMA001	**Baseline:** Dermal and ungloved hands = AB grade with 20 records; Inhalation = AB grade with 40 records. High confidence in inhalation, dermal, and hand data. **PPE**: Dermal and gloved hands = AB grade with 20 records; High confidence in dermal, and hand data. A 50% protection factor to account for an additional layer of clothing. A respirator protection factor of 5 is applied to baseline inhalation data to estimate the use of a dust mask. A respirator protection factor of 10 is applied to estimate the use of a half-face respirator. **Engineering Controls:** Not considered feasible for this exposure scenario.

Notes

1. PHED refers to the Pesticide Handler Exposure Database Version 1.1 PHED Surrogate Exposure Guide of August 1998

2. The data grade and confidence categories are assigned as follows:

   Grade A data = Lab recovery is 90 to 110 percent with a CV ≤15. Field recovery is 70 to 120 percent. Storage stability data are optional.
   Grade B data = Lab recovery is 80 to 110 percent with a CV ≤25. Field recovery is 50 to 120 percent. Storage stability data are optional.
   Grade C data = Lab recovery is 70 to 120 percent with a CV ≤33. Field recovery is 30 to 120 percent or is missing. Storage stability data is 50 to 120 percent
   Grade D data = Lab recovery is 60 to 120 percent with a CV ≤33. Field recovery and storage stability data are optional.
   Grade E data = Does not meet above criteria.

   High Confidence = grade A and B data and 15 or more records per body part
   Medium Confidence = grade A, B, and C data and 15 or more records per body part
   Low Confidence = grade A, B, C, D and E data or any combination of grades with less than 15 records.

PHED grading criteria only affect one aspect of the exposure assessment. The other exposure factors should also be considered in the risk management decision.

Table B4 - Exposure Factors and Formulas Used for MCPP-p	
Exposure Factors	**Formulas**
Inhalation Absorption = 100 percent	Daily Exposure = Application Rate * Area treated or amount applied* Unit Exposure Value
NOAEL for Short/Intermediate/Long Term Inhalation Exposures = 35 mg/kg/day (based upon the same study used for dermal exposures)	Daily Dose = (Daily Exposure * Absorption factor)/Body Weight
Body Weight = 70 kg	MOE = NOAEL/Daily Dose

Table B5 – MCPP-p Inhalation MOEs for Occupational Handlers

Exposure Scenario	Use Site	Application Rate (lb ae/acre or gallon)	Area Treated or Amount Applied per day	Units	Baseline Inhalation MOE	PF5 Inhalation MOE	PF10 Inhalation MOE	Engineering Control Inhalation MOE
M/L WP for Turfgun Application (20 PCOs)	PCO Turf	1.2	100	acres	475	2374	4748	85069
M/L WP for Groundboom	Golf Courses	1.2	40	acres	1187	5935	11870	212674
M/L DF for Turfgun Application (20 PCOs)	PCO Turf	1.2	100	acres	26515	132576	265152	85069
M/L DF for Groundboom	Golf Courses	1.2	40	acres	66288	331439	662879	212674
M/L Liquids for Turf Gun (20 PCOs)	PCO Turf	1.2	100	acres	17014	85069	170139	245984
M/L Liquids for Groundboom	Sod Farms	1.2	80	acres	21267	106337	212674	307480
M/L Liquids for Groundboom	Golf Courses	1.2	40	acres	42535	212674	425347	614960
M/L Liquids for ROW Sprayer	Non-Turf Areas	0.0184	1000	gallons	110960	554801	1109601	1604243
Load Granulars for Broadcast Spreader	Golf Courses	1.2	40	acres	30025	150123	300245	1501225
Groundboom Application	Sod Farms	1.2	80	acres	34488	172438	344876	593508
Groundboom Application	Golf Courses	1.2	40	acres	68975	344876	689752	1187016
ROW Sprayer Application	Non-Turf Areas	0.0184	1000	gallons	34142	170708	341416	ND
Turfgun Application	PCO Turf	1.2	5	acres	408333	2041667	4083333	ND
Broadcast Spreader Application	Golf Courses	1.2	40	acres	42535	212674	425347	232008
M/L/A Wettable Powder with Turfgun	PCO Turf	1.2	5	acres	6586	32930	65860	53030303
M/L/A DF with Turfgun	PCO Turf	1.2	5	acres	185606	928030	1856061	53030303
M/L/A Liquid Flowables with Turfgun	PCO Turf	1.2	5	acres	214912	1074561	2149123	ND
M/L/A Liquids with Backpack Sprayer	Non-Turf Areas	0.038	40	gallons	53728	268640	537281	ND
Load Apply Granules with a Push Cyclone	PCO Turf	1.2	5	acres	54444	272222	544444	ND

Note – All of the MOEs exceed the target MOE of 100 which indicates that the risks are not of concern.

Appendix C: Residential Handler Exposure Data and Risk Calculations for MCPP-p

Table C1: Unit Exposure Data for MCPP-p Residential Exposure Assessment			
Scenario	Data Source	Unit Exposure Values (Per lb AE Handled)	Data Confidence
1 - Hand Application of Granules	PHED	Inhalation = 467 ug	N = 16 inhalation records with grade ABC data. Medium Confidence.
2 - Aerosol Can Application	PHED	Inhalation = 1300 ug	N = 15 inhalation records with grade AB data. High Confidence (Note- based on an indoor crack and crevice study).
3 - Belly Grinder Application	PHED	Inhalation = 62 ug	N = 40 Inhalation records, AB grades. High Confidence.
4. Load Apply Granules with a Broadcast Spreader	ORETF[1]	Inhalation = 0.91 ug	Grade AB Data. N = 30 records. High Confidence despite large variability in results.
5. Mix Load Apply with a Hose-end Sprayer (Mix your own)	ORETF[1]	Inhalation = 16 ug	Grade A Data. N = 30 records. High Confidence.
6. Mix Load Apply with a Hose-end Sprayer (Ready to Use)	ORETF[1]	Inhalation = 11 ug	Grade A Data. N = 30 records. High Confidence.
7. Mix Load Apply with Hand Held Pump Sprayer	MRID[2] 444598-01	Inhalation = 9 ug	A total of 40 records per application method were monitored in this study. Half of the people wore gloves and the other half did not. The clothing scenario represents short-sleeved shirt, short pants, and no gloves. The data are considered high quality by the Agency.
8. Mix Load Apply with Ready to Use Sprayer	MRID 444598-01	Inhalation = 67 ug	

Notes for Table 1

1. This study involved the application of granular and liquid formulations of Dacthal to residential lawns. It was reviewed by Health Canada and Gary Bangs in Document #D261948.

2. This study involved the application of liquid carbaryl to home garden vegetables. It was reviewed by Jeff Dawson in Document #D287251.

Table C2: MCPP-p Inhalation MOEs for Residential Handlers

Exposure Scenario	Application Rate	Area Treated or Amount Applied	Amount of A.E. Handled per Day (lb)	Inhalation Unit Exposure Values (Per lb AE Handled)	Daily Exposure (mg/day)[a]	Daily Dose (mg/kg/day)[b]	Inhalation MOE[c]
1 - Apply Granules by Hand or Shaker Can	1.2 lb ae/acre	0.023 acre/day	0.028	467 ug	1.3E-02	1.8E-04	190,000
2 - Apply Jet Spray Spot Weed Killer (Aerosol Can)	0.0019 lb ae/can	1 can/day	0.0019	1300 ug	2.5E-03	3.5E-05	1,000,000
3 - Load Apply Granules with a Belly Grinder	1.2 lb ae/acre	0.023 acre/day	0.028	62 ug	1.7E-03	2.4E-05	1,400,000
4 - Load Apply Granules with a Broadcast Spreader	1.2 lb ae/acre	0.5 acre/day	0.6	0.91 ug	5.5E-04	7.8E-06	4,500,000
5 - Mix Load/Apply Liquids with a Hose-end Sprayer (Mix your own)	1.2 lb ae/acre	0.5 acre/day	0.6	16 ug	9.6E-03	1.4E-04	260,000
6 - Mix Load/Apply Liquids with a Hose-end Sprayer (Ready to Use)	1.2 ae/acre	0.5 acre/day	0.6	11 ug	6.6E-03	9.4E-05	370,000
7 - Mix Load/Apply Liquids with Hand Held Pump Sprayer	1.2 ae/acre	0.023 acre/day	0.028	9 ug	2.5E-04	3.5E-06	9,900,000
8 - Mix Load/Apply Liquids with Ready to Use Sprayer	1.2 ae/acre	0.023 acre/day	0.028	67 ug	1.8E-03	2.6E-05	1,300,000

a Daily Exposure (mg/day) = Amount of A.E Handled per day (lb) * Unit Exposure Value (µg exposure/ lb ae handled) * 0.001 mg/µg.
b Daily Dose (mg/kg/day) = Daily Exposure (mg/day) * Absorption Factor (1.0 for inhalation) ÷ Body Weight (70kg).
c MOE = NOAEL ÷ Daily Dose (mg/kg/day) where NOAEL = 35mg/kg/day and the target MOE is 100.

APPENDIX D - MCPP-p Turf Transferable Residue (TTR) Data

SPREADSHEET D1 - MCPP-p TTR DATA SUMMARY

Treatment	App Rate (lb ae/A)	GPA	Initial TTR (ug/cm2)	Initial TTR (Percent)	MAX TTR (ug/cm2)	Max TTR (Percent)	Slope Factor	N	R2	Half Life (days)
MRID 446557-02 North Carolina Trial 1 - Effect of Form										
DMA #8	0.6	9.9	0.066	1.0	0.113	1.7	-1.89	12	0.9	0.37
DMA Mix #9	0.6	9.9	0.052	0.8	0.104	1.6	-2.48	12	0.81	0.28
DMA Mix #10	0.6	9.9	0.080	1.2	0.122	1.8	-1.95	15	0.91	0.36
MRID 446557-03 North Carolina Trial 2 - Effect of Spray Volume										
DMA Mix	0.66	2.0	0.078	1.1	0.078	1.1	-2.25	12	0.71	0.31
DMA Mix	0.66	5.0	0.090	1.2	0.09	1.2	-2.62	12	0.93	0.26
DMA Mix	0.66	20	0.051	0.7	0.051	0.7	-2.46	12	0.94	0.28
Avg			0.073	1.0			-2.45		0.84	0.28
MRID 450331-01- California Trial										
DMA Mix #4	0.62	9.9	0.074	1.1	0.074	1.1	-0.63	24	0.95	1.10
DMA Mix #5	0.77	9.9	0.150	1.7	0.15	1.7	-0.56	24	0.92	1.24
MRID 450331-01- Wisconsin Trial										
DMA Mix #4	0.61	9.4	0.060	0.90	0.06	0.9	N/A	N/A	N/A	N/A
DMA Mix #5	0.77	9.4	0.112	1.30	0.574	6.6	N/A	N/A	N/A	N/A
AVG				1.1		1.8	-1.92		0.88	**0.50**
MAX				1.7		6.6	-0.56		0.95	**1.24**
MIN				0.7		0.7	-2.62		0.71	**0.26**

Spreadsheet D2: MRID 446557-02 NC1 Trial (Treatment #8 - MCPP-p DMA)

DAT	MCPP Data (ng/cm2)	MCPP Adjusted (ng/cm2)	Percent TTR	LN	Rainfall (inches)
Pre	<0.879				
0	70	84	1.24	4.43	0
0	41	49	0.73	3.90	0
0	54	64	0.96	4.17	0
0.50	99	119	1.76	4.78	0
0.50	76.3	92	1.36	4.52	0
0.50	107.0	129	1.91	4.86	0
1	42	50	0.74	3.91	0
1	33	40	0.59	3.68	0
1	49	58	0.87	4.07	0
2	1.13	1.36	0.02	0.31	0
2	2.10	2.52	0.04	0.93	0
2	1.41	1.69	0.03	0.53	0
3	0.45	0.54	0.01	-0.61	0.06
3	0.45	0.54	0.01	-0.61	0.06
3	0.45	0.54	0.01	-0.61	0.06

Application Method	Groundboom
Application Rate (lb ae/A)	0.6
Gallons/Acre	9.89
LOQ(ng/cm2)	0.879
LOD(ng/cm2)	Not Specified

	Avg TTR	Percent TTR
DAT 0.0	66	1.0
DAT 0.5	113	1.7

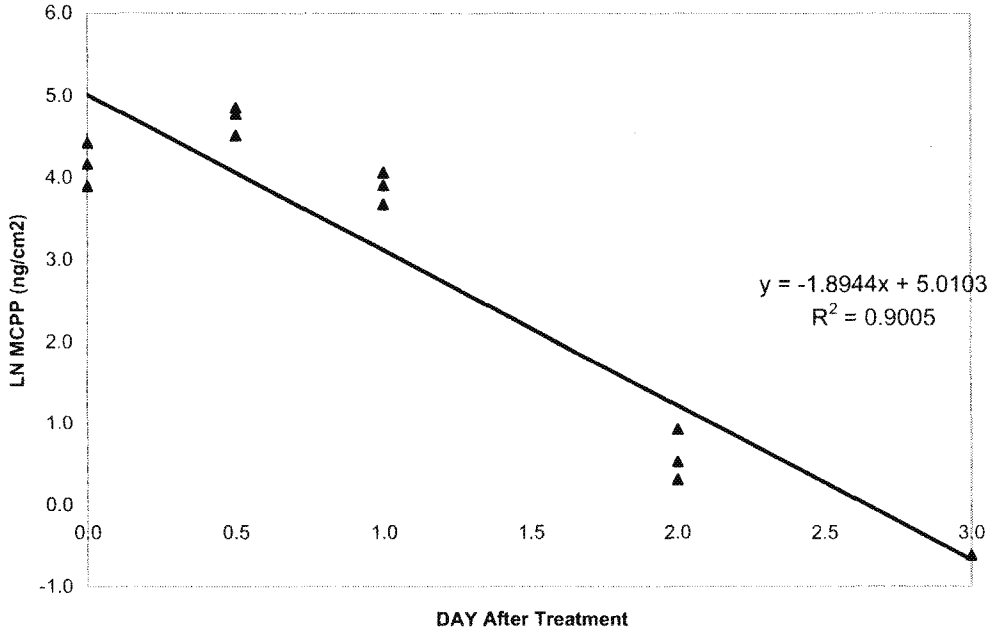
Field Recovery

(Percent) 92.7 @ 4ng/cm2 (n=6, SD = 12)
92.4 @ 40ng/cm2 (n=6, SD = 9.4)
83.2 for DAT 0 samples (n=6, SD=3.3)
102 for DAT 6 samples (n=6, SD=3.5)

Half Life (days) 0.37

TTR values were corrected for field recovery of 83.2 percent

Note: DAT 1 samples were collected one hour early due to threat of rain as stated in the protocol deviation.



Spreadsheet D3: MRID 446557-02 NC1 Trial (Treatment #9 - 2,4-D DMA + MCPPp DMA + Dicamba DMA)

DAT	MCPP-p Data (ng/cm2)	MCPP-p Adjusted (ng/cm2)	Percent TTR	LN	Rainfall (inches)
Pre	<0.879				
0	35	43	0.64	3.76	0
0	46	56	0.83	4.03	0
0	46	56	0.83	4.03	0
0.50	65	79	1.18	4.37	0
0.50	89.0	109	1.62	4.69	0
0.50	102.0	125	1.86	4.83	0
1	26	32	0.48	3.48	0
1	26	32	0.47	3.46	0
1	26	32	0.47	3.46	0
2	0.45	0.55	0.01	-0.60	0
2	0.45	0.55	0.01	-0.60	0
2	0.45	0.55	0.01	-0.60	0

Application Method	Groundboom
Application Rate (lb ae/A)	0.6
Gallons/Acre	9.89
LOQ(ng/cm2)	0.879
LOD(ng/cm2)	Not Specified

	Avg TTR	Percent TTR
DAT 0.0	52	0.8
DAT 0.5	104	1.6

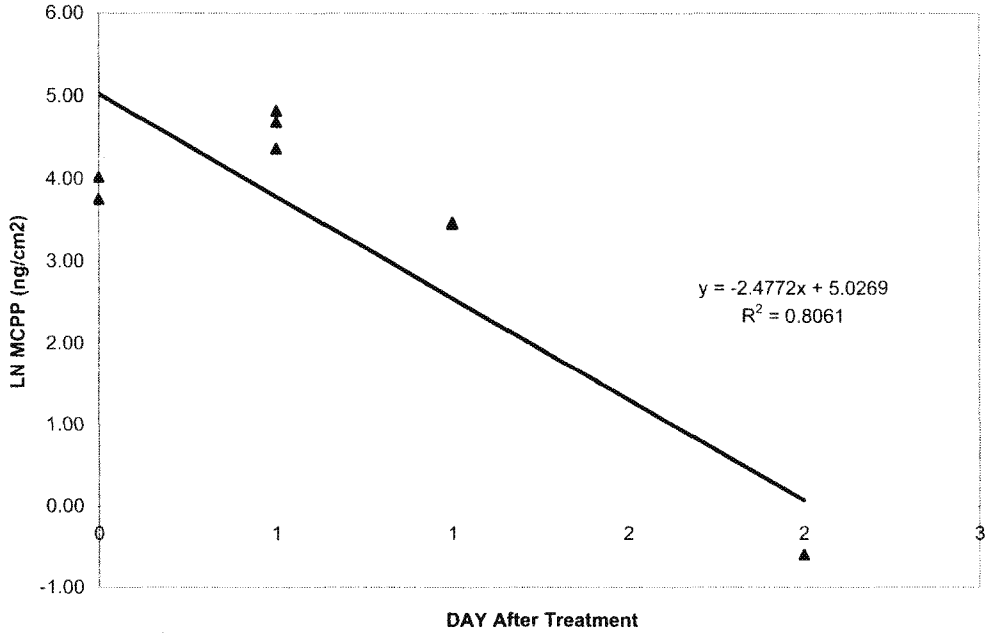
Field Recovery

(Percent) 92.5 @ 4ng/cm2 (n=6, SD = 10.4)
84.1 @ 40ng/cm2 (n=6, SD = 7.9)
81.6 for DAT 0 samples (n=6, SD=7.4)
95.0 for DAT 6 samples (n=6, SD=7.4)

Half Life (days) 0.28

TTR values were corrected for field recovery of 81.6 percent

Note: DAT 1 samples were collected one hour early due to threat of rain as stated in the protocol deviation.



Spreadsheet D4: MRID 446557-02 NC1 Trial (Treatment #10 - MCPA DMA + MCPPp DMA + 2,4-DP DMA)

DAT	MCPP-p Data (ng/cm2)	MCPP-p Adjusted (ng/cm2)	Percent TTR	LN	Rainfall (inches)
Pre	<0.879				
0	92	107	1.58	4.67	0
0	47	55	0.81	4.00	0
0	68	79	1.18	4.38	0
0.50	89	103	1.53	4.63	0
0.50	59.3	69	1.02	4.23	0
0.50	167.0	194	2.88	5.27	0
1	37	42	0.63	3.75	0
1	11	13	0.20	2.58	0
1	37	43	0.64	3.77	0
2	1.37	1.59	0.02	0.46	0
2	1.20	1.39	0.02	0.33	0
2	0.94	1.09	0.02	0.08	0
3	0.45	0.52	0.01	-0.65	0.06
3	0.45	0.52	0.01	-0.65	0.06
3	0.45	0.52	0.01	-0.65	0.06

Application Method	Groundboom
Application Rate (lb ae/A)	0.6
Gallons/Acre	9.89
LOQ(ng/cm2)	0.879
LOD(ng/cm2)	Not Specified

	Avg TTR	Percent TTR
DAT 0.0	80	1.2
DAT 0.5	122	1.8

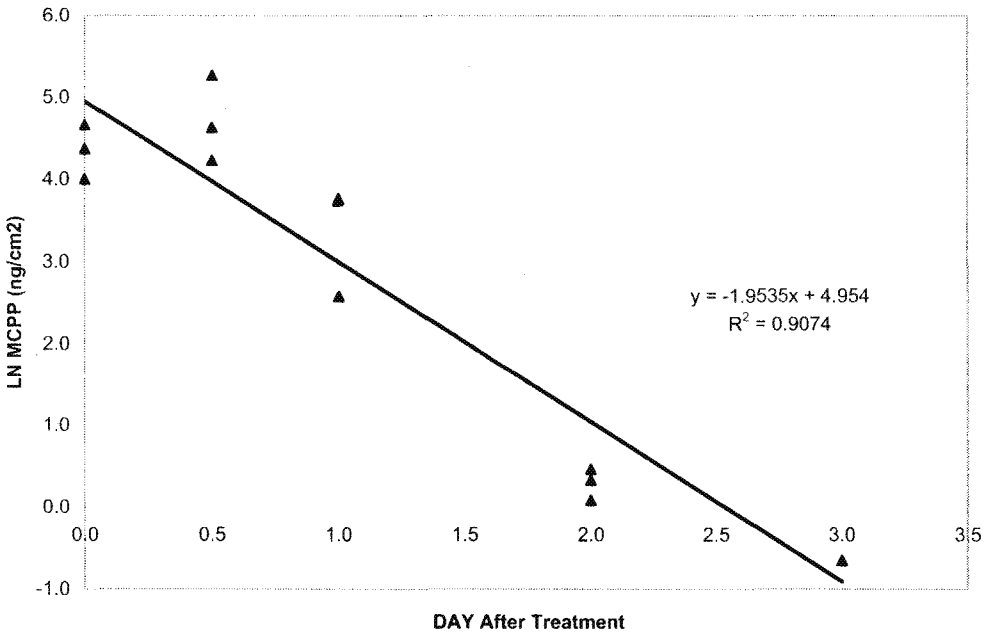
Field Recovery

(Percent) 81.4 @ 4ng/cm2 (n=6, SD = 12.1)
74.5 @ 40ng/cm2 (n=6, SD = 9.9)
68.9 for DAT 0 samples (n=6, SD=6.3)
87.1 for DAT 6 samples (n=6, SD=5.9)

Half Life (days) 0.36

TTR values were corrected for field recovery of 86.1 percent

Note: DAT 1 samples were collected one hour early due to threat of rain as stated in the protocol deviation.



Spreadsheet D5: MRID 446557-03 NC2 Trial 2 GPA Treatment (2,4-D DMA with MCPP-p DMA and Dicamba DMA)

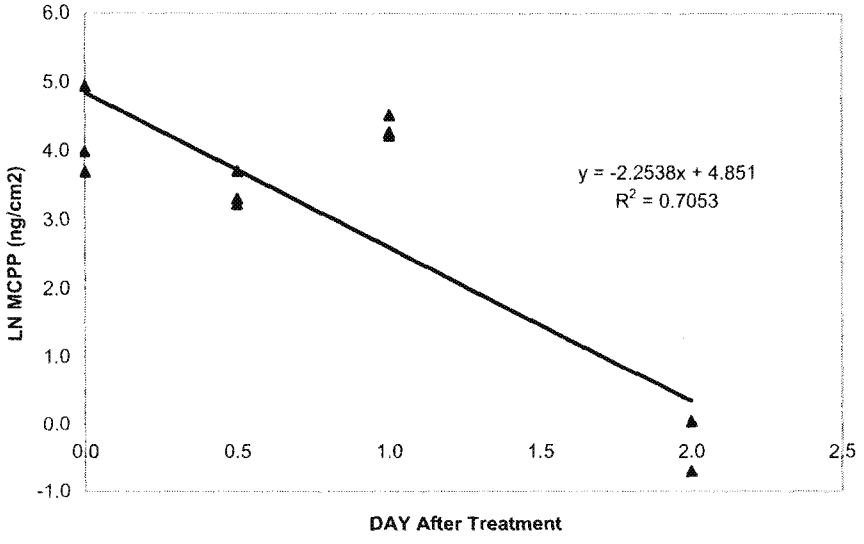
DAT	MCPP-p Raw Data (ng/cm2)	MCPP-p Adjusted (ng/cm2)	LN	Rainfall (inches)
Pre	<0.879			
0	36	40	3.69	0
0	124	140	4.94	0
0	48	54	3.99	0
0.50	36	41	3.71	0
0.50	24.2	27	3.31	0
0.50	22.4	25	3.23	0
1	82	92	4.52	0
1	61	68	4.23	0
1	64	72	4.27	0
2	0.92	1.0	0.04	0.17
2	0.44	0.50	-0.70	0.17
2	0.44	0.50	-0.70	0.17

Application Method	Groundboom
Application Rate (lb ae/A)	0.66
Gallons/Acre	2
LOQ(ng/cm2)	0.879
LOD(ng/cm2)	Not Specified

	Avg TTR	Percent TTR
DAT 0.0	78	1.1
DAT 1.0	77	1.0
Half Life (days)		0.31

Field Recovery (percent)
94.3 @ 4ng/cm2 (n=6, SD = 2.7)
88.5 @ 40ng/cm2 (n=6, SD = 4.0)
92.1 for DAT 0 samples (n=6, SD=4.8)
90.6 for DAT 6 samples (n=6, SD=4.4)

All values were corrected for field recovery of 88.5 percent



Spreadsheet D6: MRID 446557-03 NC2 Trial 5 GPA Treatment (2,4-D DMA with MCPP-p DMA and Dicamba DMA)

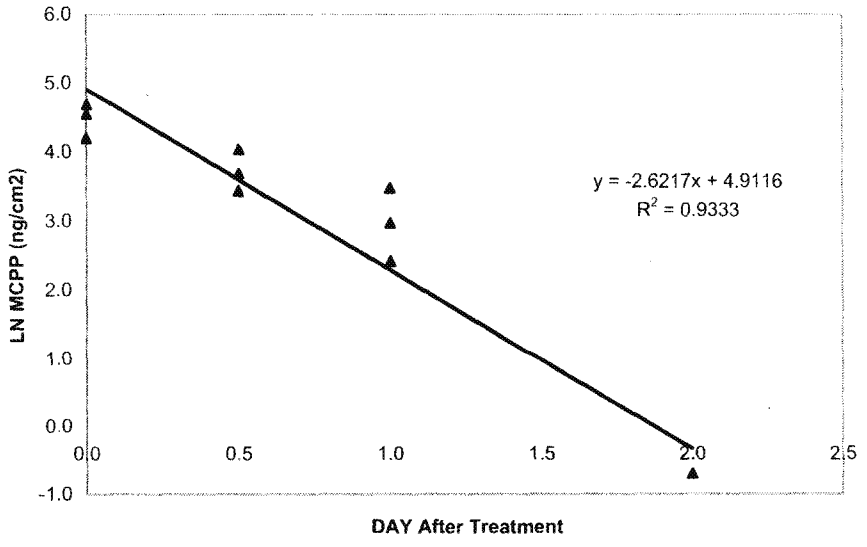
DAT	MCPP-p Raw Data (ng/cm2)	MCPP-p Adjusted (ng/cm2)	LN	Rainfall (inches)
Pre	<0.879			
0	97	109	4.69	0
0	84	95	4.55	0
0	59	67	4.20	0
0.50	50	57	4.04	0
0.50	35.5	40	3.69	0
0.50	27.7	31	3.44	0
1	17	20	2.98	0
1	10	11	2.42	0
1	29	33	3.48	0
2	0.44	0.50	-0.70	0.17
2	0.44	0.50	-0.70	0.17
2	0.44	0.50	-0.70	0.17

Application Method	Groundboom
Application Rate (lb ae/A)	0.66
Gallons/Acre	5
LOQ(ng/cm2)	0.879
LOD(ng/cm2)	Not Specified

	Avg TTR	Percent TTR
DAT 0.0	90	1.2
DAT 1.0	21	0.3
Half Life (days)		0.26

Field Recovery (percent)
94.3 @ 4ng/cm2 (n=6, SD = 2.7)
88.5 @ 40ng/cm2 (n=6, SD = 4.0)
92.1 for DAT 0 samples (n=6, SD=4.8)
90.6 for DAT 6 samples (n=6, SD=4.4)

All values were corrected for field recovery of 88.5 percent



Spreadsheet D7: MRID 446557-03 NC2 Trial 20 GPA Treatment (2,4-D DMA with MCPP-p DMA and Dicamba DMA)

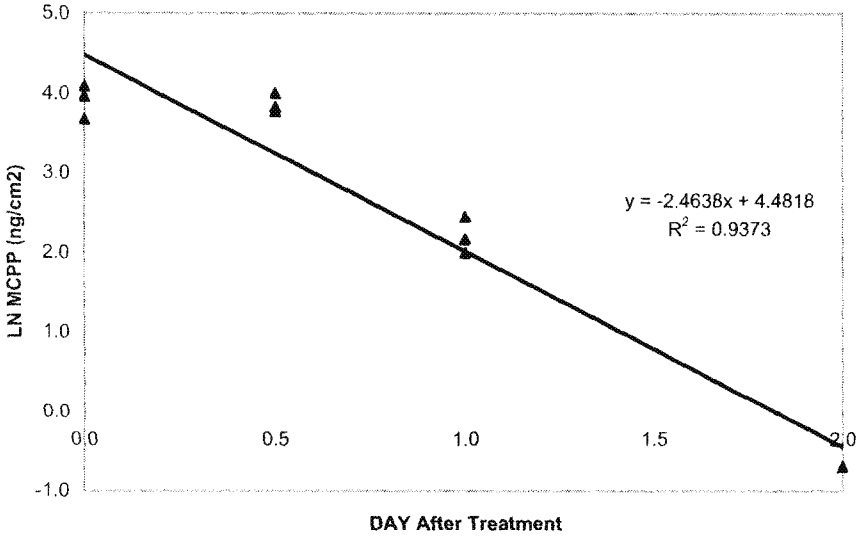
DAT	MCPP-p Raw Data (ng/cm2)	MCPP-p Adjusted (ng/cm2)	LN	Rainfall (inches)
Pre	<0.879			
0	53	60	4.10	0
0	35	40	3.68	0
0	47	53	3.97	0
0.50	41	46	3.84	0
0.50	49	55	4.01	0
0.50	39	44	3.78	0
1	6.6	7.4	2.00	0
1	7.8	8.8	2.17	0
1	10	12	2.45	0
2	0.44	0.50	-0.70	0.17
2	0.44	0.50	-0.70	0.17
2	0.44	0.50	-0.70	0.17
3 to 14	0.44			

Application Method	Groundboom
Application Rate (lb ae/A)	0.66
Gallons/Acre	20
LOQ(ng/cm2)	0.879
LOD(ng/cm2)	Not Specified

	Avg TTR	Percent TTR
DAT 0.0	51	0.7
DAT 1.0	9	0.1
Half Life (days)		0.28

Field Recovery (percent)
94.3 @ 4ng/cm2 (n=6, SD = 2.7)
88.5 @ 40ng/cm2 (n=6, SD = 4.0)
92.1 for DAT 0 samples (n=6, SD=4.8)
90.6 for DAT 6 samples (n=6, SD=4.4)

All values were corrected for field recovery of 88.5 percent



Spreadsheet D8: MRID 446557-03 (2,4-D DMA with MCPP-p DMA and Dicamba DMA)

DAT	GPA	MCPP-p Raw Data (ng/cm2)	MCPP-p Adjusted (ng/cm2)	LN	Rainfall (inches)
Pre		<0.879			
0	2	36	40	3.69	0
0	2	124	140	4.94	0
0	2	48	54	3.99	0
0	5	97	109	4.69	0
0	5	84	95	4.55	0
0	5	59	67	4.20	0
0	20	53	60	4.10	0
0	20	35	40	3.68	0
0	20	47	53	3.97	0
0.50	2	36	41	3.71	0
0.50	2	24.2	27	3.31	0
0.50	2	22.4	25	3.23	0
0.50	5	50	57	4.04	0
0.50	5	35.5	40	3.69	0
0.50	5	27.7	31	3.44	0
0.50	20	41	46	3.84	0
0.50	20	49	55	4.01	0
0.50	20	39	44	3.78	0
1	2	82	92	4.52	0
1	2	61	68	4.23	0
1	2	64	72	4.27	0
1	5	17	20	2.98	0
1	5	10	11	2.42	0
1	5	29	33	3.48	0
1	20	6.6	7.4	2.00	0
1	20	7.8	8.8	2.17	0
1	20	10	12	2.45	0
2	2	0.92	1.0	0.04	0.17
2	2	0.44	0.50	-0.70	0.17
2	2	0.44	0.50	-0.70	0.17
2	5	0.44	0.50	-0.70	0.17
2	5	0.44	0.50	-0.70	0.17
2	5	0.44	0.50	-0.70	0.17
2	20	0.44	0.50	-0.70	0.17
2	20	0.44	0.50	-0.70	0.17
2	20	0.44	0.50	-0.70	0.17

Application Method	Groundboom
Application Rate (lb ae/A)	0.66
Gallons/Acre	2, 5 or 20
LOQ(ng/cm2)	0.879
LOD(ng/cm2)	Not Specified

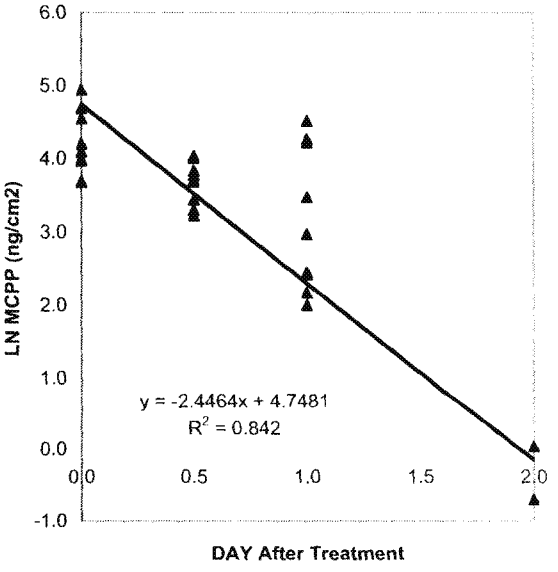
	Avg TTR	Percent TTR
DAT 0.0	73	1.0
DAT 0.5	41	0.6

Field Recovery (percent)

94.3 @ 4ng/cm2 (n=6, SD = 2.7)
88.5 @ 40ng/cm2 (n=6, SD = 4.0)
92.1 for DAT 0 samples (n=6, SD=4.8)
90.6 for DAT 6 samples (n=6, SD=4.4)

All values were corrected for field recovery of 88.5 percent

Half Life (days) 0.28



Spreadsheet D9: MRID 450331-01 CA Trial Treatment #4 (2,4-D, MCPP-p and Dicamba) (Including DAT 5 Data)

DAT	MCPP-p Raw Data (ng/cm2)	MCPP-p Adjusted (ng/cm2)	LN	Rainfall (inches)
Pre	0.088			
0.042	66	75	4.32	0
0.042	72	82	4.41	0
0.042	57	65	4.18	0
0.17	60	69	4.23	0
0.17	63	72	4.27	0
0.17	53	60	4.09	0
0.33	33	37	3.61	0
0.33	34	39	3.65	0
0.33	24	27	3.31	0
0.50	277	316	5.76	0
0.50	391	446	6.10	0
0.50	479	546	6.30	0
1	21	23	3.15	0
1	16	18	2.90	0
1	18	21	3.03	0
2	16	19	2.92	0
2	13	15	2.70	0
2	8.0	9.1	2.21	0
3	5.9	6.7	1.91	0
3	5.6	6.4	1.86	0
3	4.9	5.6	1.72	0
4	3.7	4.2	1.43	0
4	2.3	2.6	0.96	0
4	2.4	2.7	0.99	0
7	0.9	1.0	0.01	0
7	0.9	1.1	0.07	0
7	0.5	0.6	-0.58	0

Application Method	**Groundboom**
Application Rate (lb ae/A)	0.62
Gallons/Acre	9.9
LOQ(ng/cm2)	0.879
LOD(ng/cm2)	0.088

	Avg TTR	Percent TTR
DAT 0.042	74	1.1
DAT 0.5	436	6.3

Field Recovery (from MRID 446557-02)

(Percent)
- 92.7 @ 4ng/cm2 (n=6, SD = 12)
- 92.4 @ 40ng/cm2 (n=6, SD = 9.4)
- 83.2 for DAT 0 samples (n=6, SD=3.3)
- 102 for DAT 6 samples (n=6, SD=3.5)

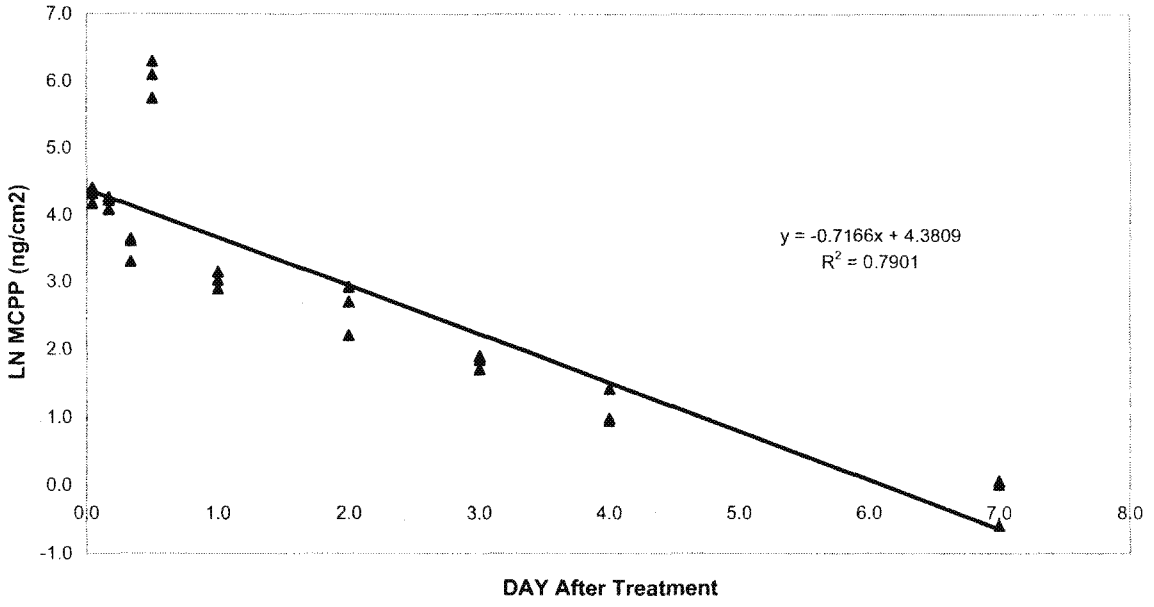
Field Recovery (from MRID 446557-03)

(Percent)
- 94.3 @ 4ng/cm2 (n=6, SD = 2.7)
- 88.5 @ 40ng/cm2 (n=6, SD = 4.0)
- 92.1 for DAT 0 samples (n=6, SD=4.8)
- 90.6 for DAT 6 samples (n=6, SD=4.4)

Average Recovery
- 93.5 @ 4 ng/cm2 (n=12)
- 90.5 @ 40 ng/cm2 (n=12)
- 87.7 @ DAT 0 (n=12)
- 96.3 @ DAT 6 (n=12)

Half Life (days) 0.96

Values were adjusted for average field recovery of 87.7 at DAT 0



Spreadsheet D10: MRID 450331-01 CA Trial Treatment #4 (2,4-D, MCPP-p and Dicamba) (Excluding DAT 5 Data)

DAT	MCPP-p Raw Data (ng/cm2)	MCPP-p Adjusted (ng/cm2)	LN	Rainfall (inches)
Pre	0.088			
0.042	66	75	4.32	0
0.042	72	82	4.41	0
0.042	57	65	4.18	0
0.17	60	69	4.23	0
0.17	63	72	4.27	0
0.17	53	60	4.09	0
0.33	33	37	3.61	0
0.33	34	39	3.65	0
0.33	24	27	3.31	0
1	21	23	3.15	0
1	16	18	2.90	0
1	18	21	3.03	0
2	16	19	2.92	0
2	13	15	2.70	0
2	8.0	9.1	2.21	0
3	5.9	6.7	1.91	0
3	5.6	6.4	1.86	0
3	4.9	5.6	1.72	0
4	3.7	4.2	1.43	0
4	2.3	2.6	0.96	0
4	2.4	2.7	0.99	0
7	0.9	1.0	0.01	0
7	0.9	1.1	0.07	0
7	0.5	0.6	-0.58	0

Values were adjusted for average field recovery of 87.7 at DAT 0

Application Method Groundboom
Application Rate (lb ae/A) 0.62
Gallons/Acre 9.9

LOQ(ng/cm2) 0.879
LOD(ng/cm2) 0.088

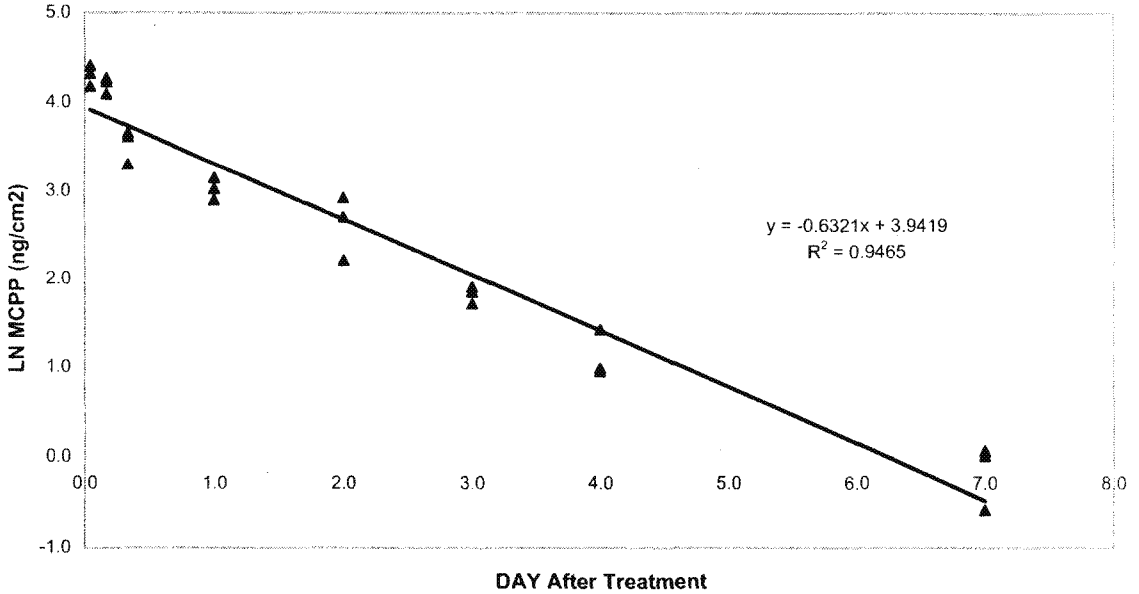
	Avg TTR	Percent TTR
DAT 0.042	74	1.1

Field Recovery (from MRID 446557-02)
(Percent) 92.7 @ 4ng/cm2 (n=6, SD = 12)
92.4 @ 40ng/cm2 (n=6, SD = 9.4)
83.2 for DAT 0 samples (n=6, SD=3.3)
102 for DAT 6 samples (n=6, SD=3.5)

Field Recovery (from MRID 446557-03)
(Percent) 94.3 @ 4ng/cm2 (n=6, SD = 2.7)
88.5 @ 40ng/cm2 (n=6, SD = 4.0)
92.1 for DAT 0 samples (n=6, SD=4.8)
90.6 for DAT 6 samples (n=6, SD=4.4)

Average Recovery
93.5 @ 4 ng/cm2 (n=12)
90.5 @ 40 ng/cm2 (n=12)
87.7 @ DAT 0 (n=12)
96.3 @ DAT 6 (n=12)

Half Life (days) 1.10



Spreadsheet D11: MRID 450331-01 CA Trial with Treatment #5 (MCPA, MCPP-p and 2,4-DP-p) (Including DAT 0.5 Data)

DAT	MCPP-p Raw Data (ng/cm2)	MCPP-p Adjusted (ng/cm2)	LN	Rainfall (inches)
Pre	0.088			
0.042	124	141	4.95	0
0.042	151	172	5.15	0
0.042	119	136	4.91	0
0.17	95	108	4.69	0
0.17	90	103	4.63	0
0.17	91	104	4.64	0
0.33	45	52	3.94	0
0.33	43	49	3.89	0
0.33	29	33	3.48	0
0.50	903	1030	6.94	0
0.50	914	1042	6.95	0
0.50	824	940	6.85	0
1	29	33	3.51	0
1	26	29	3.37	0
1	28.6	33	3.48	0
2	26.0	30	3.39	0
2	25.7	29	3.38	0
2	24.5	28	3.33	0
3	15.0	17	2.84	0
3	10.8	12	2.51	0
3	9.7	11	2.40	0
4	5.8	6.6	1.89	0
4	6.4	7.3	1.99	0
4	6.4	7.3	1.98	0
7	2.4	2.7	0.99	0
7	1.7	1.9	0.64	0
7	1.8	2.1	0.72	0

Application Method	**Groundboom**
Application Rate (lb ae/A)	0.77
Gallons/Acre	9.9
LOQ(ng/cm2)	0.879
LOD(ng/cm2)	0.088

	Avg TTR	Percent TTR
DAT 0.042	150	1.7
DAT 0.5	1004	11.6

Field Recovery (from MRID 446557-02)

(Percent)
- 92.7 @ 4ng/cm2 (n=6, SD = 12)
- 92.4 @ 40ng/cm2 (n=6, SD = 9.4)
- 83.2 for DAT 0 samples (n=6, SD=3.3)
- 102 for DAT 6 samples (n=6, SD=3.5)

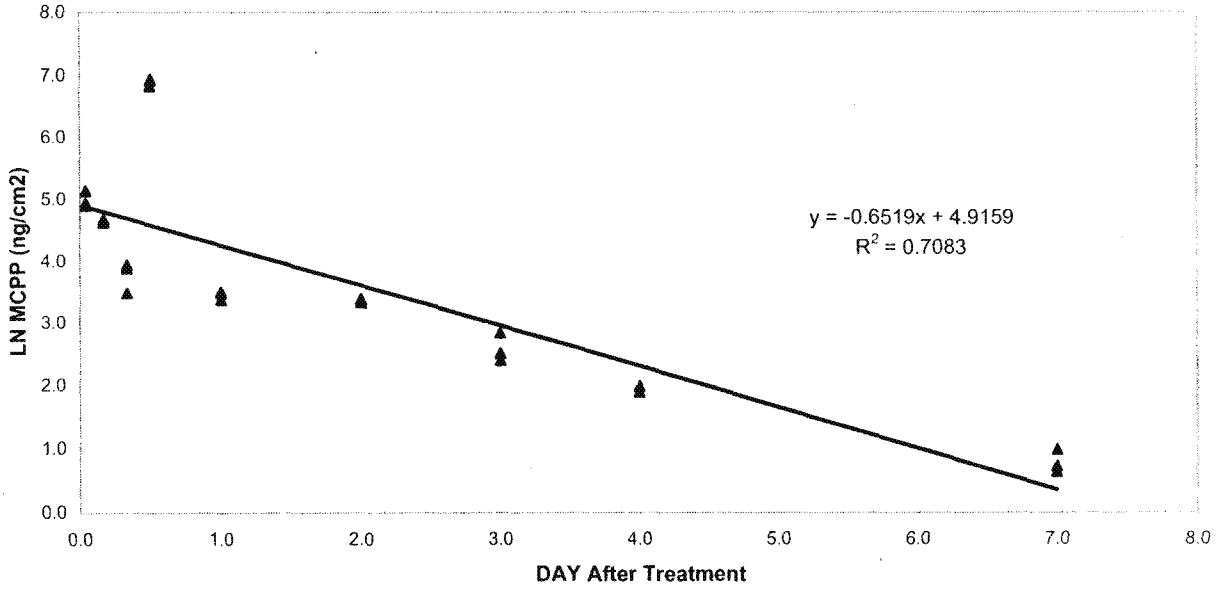
Field Recovery (from MRID 446557-03)

(Percent)
- 94.3 @ 4ng/cm2 (n=6, SD = 2.7)
- 88.5 @ 40ng/cm2 (n=6, SD = 4.0)
- 92.1 for DAT 0 samples (n=6, SD=4.8)
- 90.6 for DAT 6 samples (n=6, SD=4.4)

Average Recovery
- 93.5 @ 4 ng/cm2 (n=12)
- 90.5 @ 40 ng/cm2 (n=12)
- 87.7 @ DAT 0 (n=12)
- 96.3 @ DAT 6 (n=12)

Half Life (days) 0.98

Values were adjusted for average field recovery of 87.7 at DAT 0



Spreadsheet D12: MRID 450331-01 CA Trial with Treatment #5 (MCPA, MCPP-p and 2,4-DP-p) (Excluding DAT 0.5 Data)

DAT	MCPP-p Raw Data (ng/cm2)	MCPP-p Adjusted (ng/cm2)	LN	Rainfall (inches)
Pre	0.088			
0.042	124	141	4.95	0
0.042	151	172	5.15	0
0.042	119	136	4.91	0
0.17	95	108	4.69	0
0.17	90	103	4.63	0
0.17	91	104	4.64	0
0.33	45	52	3.94	0
0.33	43	49	3.89	0
0.33	29	33	3.48	0
1	29	33	3.51	0
1	26	29	3.37	0
1	28.6	33	3.48	0
2	26.0	30	3.39	0
2	25.7	29	3.38	0
2	24.5	28	3.33	0
3	15.0	17	2.84	0
3	10.8	12	2.51	0
3	9.7	11	2.40	0
4	5.8	6.6	1.89	0
4	6.4	7.3	1.99	0
4	6.4	7.3	1.98	0
7	2.4	2.7	0.99	0
7	1.7	1.9	0.64	0
7	1.8	2.1	0.72	0

Values were adjusted for average field recovery of 87.7 at DAT 0

Application Method	**Groundboom**
Application Rate (lb ae/A)	0.77
Gallons/Acre	9.9
LOQ(ng/cm2)	0.879
LOD(ng/cm2)	0.088

	Avg TTR	Percent TTR
DAT 0.042	150	1.7

Field Recovery (from MRID 446557-02)

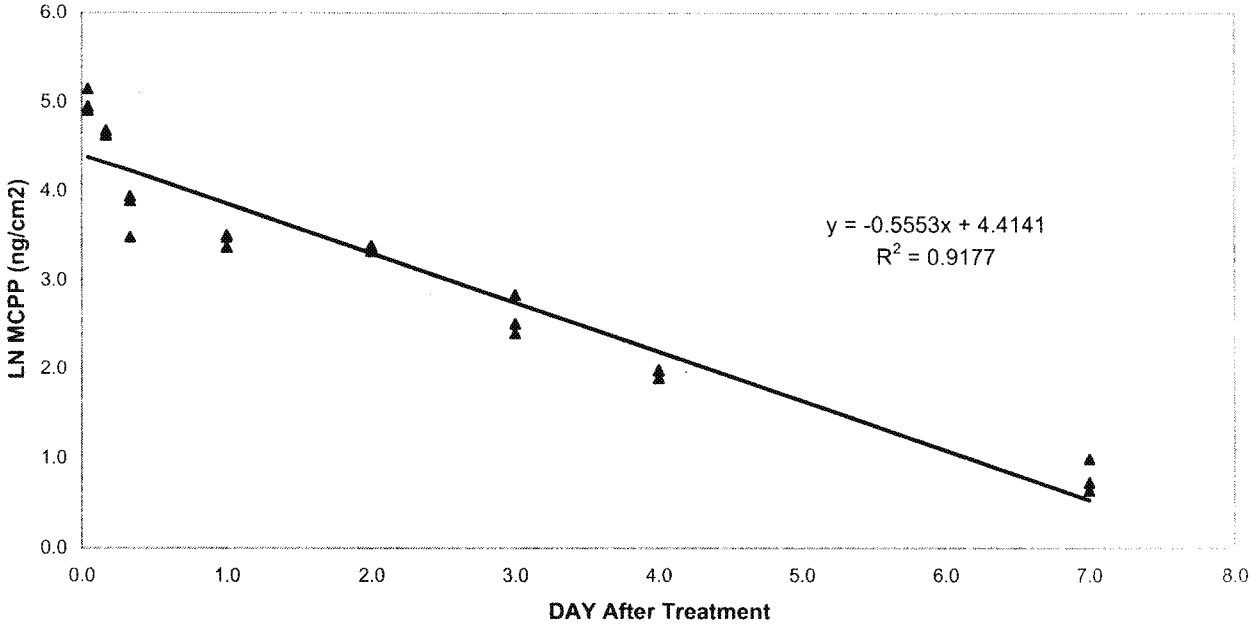
(Percent)
- 92.7 @ 4ng/cm2 (n=6, SD = 12)
- 92.4 @ 40ng/cm2 (n=6, SD = 9.4)
- 83.2 for DAT 0 samples (n=6, SD=3.3)
- 102 for DAT 6 samples (n=6, SD=3.5)

Field Recovery (from MRID 446557-03)

(Percent)
- 94.3 @ 4ng/cm2 (n=6, SD = 2.7)
- 88.5 @ 40ng/cm2 (n=6, SD = 4.0)
- 92.1 for DAT 0 samples (n=6, SD=4.8)
- 90.6 for DAT 6 samples (n=6, SD=4.4)

Average Recovery
- 93.5 @ 4 ng/cm2 (n=12)
- 90.5 @ 40 ng/cm2 (n=12)
- 87.7 @ DAT 0 (n=12)
- 96.3 @ DAT 6 (n=12)

Half Life (days) 1.24



Spreadsheet D13: MRID 450331-01 WI Treatment #4 (2,4-D, MCPP-p and Dicamba)

DAT	MCPP-p Raw Data (ng/cm2)	MCPP-p Adjusted (ng/cm2)	LN	Rainfall (inches)
Pre	0.088			
0.042	61	70	4.24	0
0.042	49	56	4.02	0
0.042	49	56	4.02	0
0.17	31.0	35	3.57	0
0.17	32	36	3.58	0
0.17	31.2	36	3.57	0
0.33	42	48	3.88	0.025
0.33	42	48	3.86	0.025
0.33	47	54	3.98	0.025
0.5	24.9	28	3.35	0.145
0.5	14.7	17	2.82	0.145
0.5	29	33	3.50	0.145
1	0.44	0.5	-0.69	0.19
1	0.44	0.5	-0.69	0.19
1	0.44	0.5	-0.69	0.19

Application Method	**Groundboom**
Application Rate (lb ae/A)	0.614
Gallons/Acre	9.42
LOQ(ng/cm2)	0.879
LOD(ng/cm2)	0.088

	Avg TTR	Percent TTR
DAT 0.0042	60	0.9

Field Recovery (from MRID 446557-02)

(Percent)
92.7 @ 4ng/cm2 (n=6, SD = 12)
92.4 @ 40ng/cm2 (n=6, SD = 9.4)
83.2 for DAT 0 samples (n=6, SD=3.3)
102 for DAT 6 samples (n=6, SD=3.5)

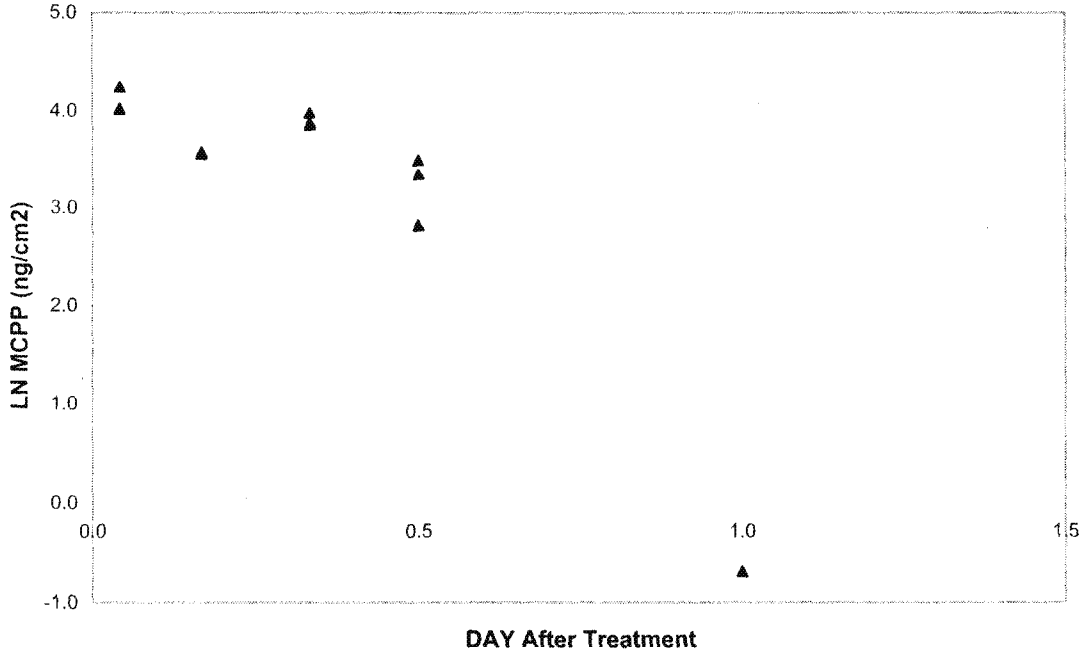
Field Recovery (from MRID 446557-03)

(Percent)
94.3 @ 4ng/cm2 (n=6, SD = 2.7)
88.5 @ 40ng/cm2 (n=6, SD = 4.0)
92.1 for DAT 0 samples (n=6, SD=4.8)
90.6 for DAT 6 samples (n=6, SD=4.4)

Average Recovery

93.5 @ 4 ng/cm2 (n=12)
90.5 @ 40 ng/cm2 (n=12)
87.7 @ DAT 0 (n=12)
96.3 @ DAT 6 (n=12)

Values were adjusted for average field recovery of 87.7 at DAT 0



Spreadsheet D14: MRID 450331-01 WI Treatment #5 (MCPA, MCPP-p and 2,4-DP-p)

DAT	MCPP-p Raw Data (ng/cm2)	MCPP-p Adjusted (ng/cm2)	LN	Rainfall (inches)
Pre	0.088			
0.042	96	109	4.69	0
0.042	79	90	4.50	0
0.042	120	137	4.92	0
0.17	80.2	91	4.52	0
0.17	62	70	4.25	0
0.17	57.5	66	4.18	0
0.33	180	205	5.32	0.025
0.33	435	496	6.21	0.025
0.33	894	1019	6.93	0.025
0.5	31.8	36	3.59	0.145
0.5	25.8	29	3.38	0.145
0.5	32	36	3.58	0.145
1	0.44	0.5	-0.69	0.19
1	0.44	0.5	-0.69	0.19
1	0.44	0.5	-0.69	0.19

Application Method	**Groundboom**
Application Rate (lb ae/A)	0.77
Gallons/Acre	9.42
LOQ(ng/cm2)	0.879
LOD(ng/cm2)	0.088

	Avg TTR	Percent TTR
DAT 0.0042	112	1.3
DAT 0.33	574	6.6

Field Recovery (from MRID 446557-02)

(Percent)
92.7 @ 4ng/cm2 (n=6, SD = 12)
92.4 @ 40ng/cm2 (n=6, SD = 9.4)
83.2 for DAT 0 samples (n=6, SD=3.3)
102 for DAT 6 samples (n=6, SD=3.5)

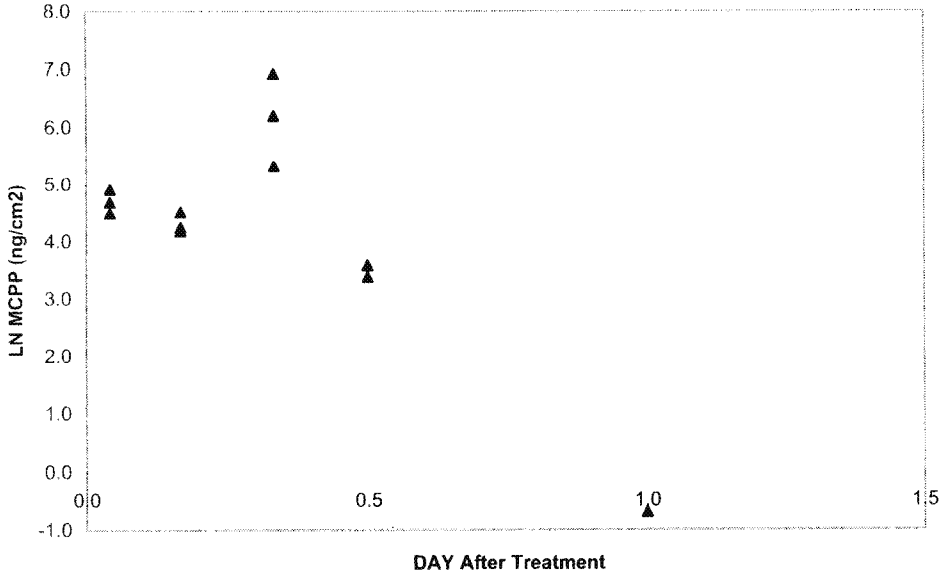
Field Recovery (from MRID 446557-03)

(Percent)
94.3 @ 4ng/cm2 (n=6, SD = 2.7)
88.5 @ 40ng/cm2 (n=6, SD = 4.0)
92.1 for DAT 0 samples (n=6, SD=4.8)
90.6 for DAT 6 samples (n=6, SD=4.4)

Average Recovery

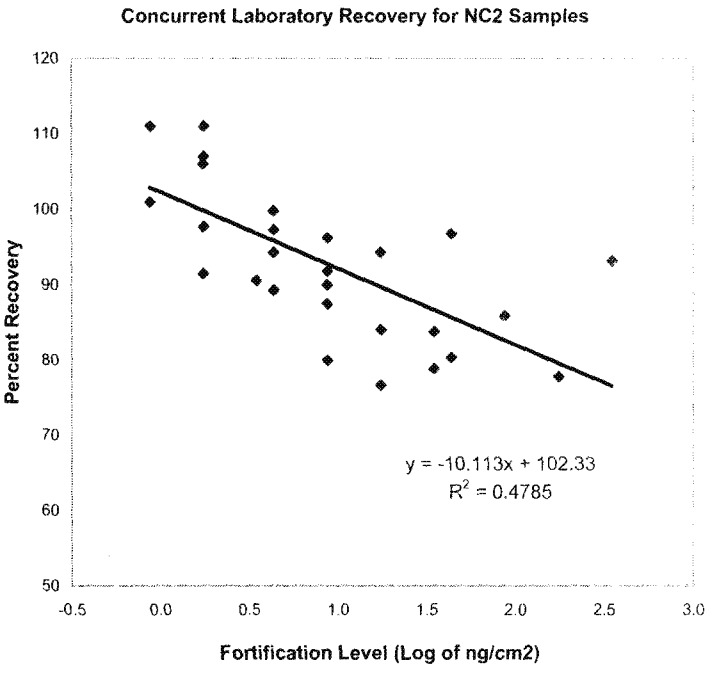
(Percent)
93.5 @ 4 ng/cm2 (n=12)
90.5 @ 40 ng/cm2 (n=12)
87.7 @ DAT 0 (n=12)
96.3 @ DAT 6 (n=12)

Values were adjusted for average field recovery of 87.7 at DAT 0



Spreadsheet D15 - Concurrent Laboratory Recovery for MRID 446557-03

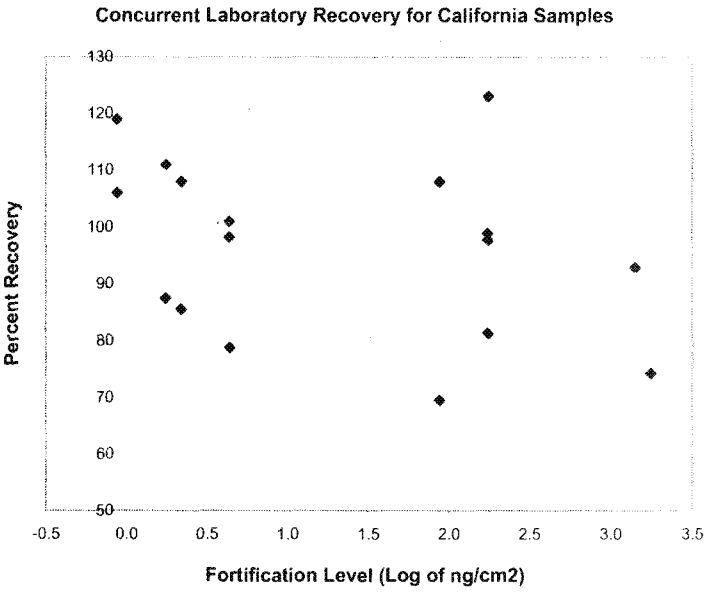
Set No	ng/cm2	Log	recovery
201	351	2.55	93.2
201	17.6	1.25	94.3
202	8.79	0.94	87.5
202	35.1	1.55	78.9
203	3.51	0.55	90.6
203	8.79	0.94	80
204	0.879	-0.06	101
204	1.76	0.25	91.5
301	8.79	0.94	96.2
301	176	2.25	77.8
302R	17.6	1.25	84.1
302R	35.1	1.55	83.8
303	4.39	0.64	99.8
303	8.79	0.94	90
304	0.879	-0.06	111
304	1.76	0.25	106
401A	87.9	1.94	85.9
401A	1.76	0.25	111
402	8.79	0.94	91.8
402	17.6	1.25	76.7
403	4.39	0.64	97.3
403	1.76	0.25	97.7
404	0.879	-0.06	111
404	1.76	0.25	107
FF01	4.39	0.64	89.3
FF01	43.9	1.64	80.4
FFO2R	4.39	0.64	94.3
FFO2R	43.9	1.64	96.8
Average			93
SD			10.0



Spreadsheet D16 - Concurrent Laboratory Recovery for MRID 450331-01

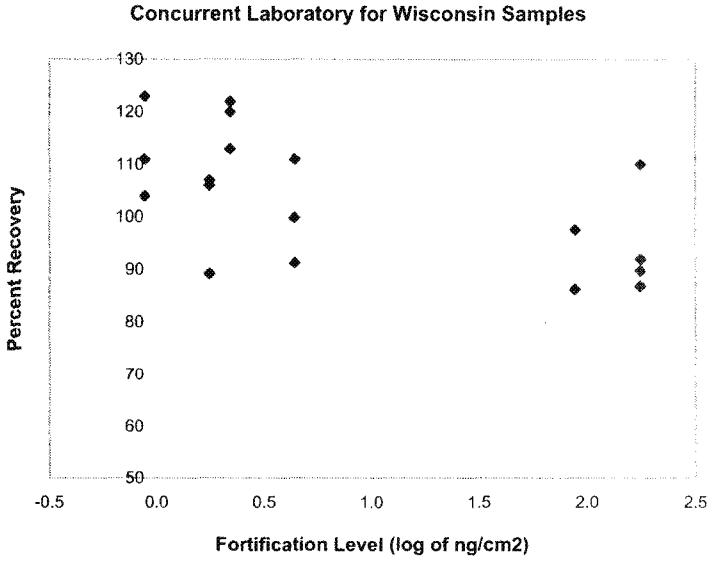
California Site Results

Set No	ng/cm2	Log	recovery
402	87.9	1.94	108
402	176	2.25	98.9
403	2.2	0.34	85.5
403	4.39	0.64	78.8
404	1.76	0.25	111
404A	0.879	-0.06	119
405	4.39	0.64	98.2
405	176	2.25	123
405	1410	3.15	92.9
502A	87.9	1.94	69.5
502A	176	2.25	81.3
503A	2.2	0.34	108
503A	4.39	0.64	101
504	0.879	-0.06	106
504	1.76	0.25	87.5
505	4.39	0.64	98.2
505	176	2.25	97.7
505	1760	3.25	74.4
Average			97
SD			14.5



Wisconsin Site Results

Set No	ng/cm2	Log	recovery
406a	87.9	1.94	97.5
406a	176	2.25	86.9
407	2.2	0.34	122
407	2.2	0.34	113
408a	0.879	-0.06	111
408a	1.76	0.25	89.2
408a	0.879	-0.06	104
408a	1.76	0.25	107
410	4.39	0.64	111
410	176	2.25	110
506	87.9	1.94	86.2
506	176	2.25	92
507a	2.2	0.34	120
507a	4.39	0.64	99.8
508	0.879	-0.06	123
508	1.76	0.25	106
510	4.39	0.64	91.3
510	176	2.25	89.8
Average			103
SD			11.9



Appendix E - Residential Turf Post Application Risk Assessment for MCPP-p

Spreadsheet E1: Input Values

Label Application Rate (lb ae/acre):	1.20
Study Application Rate (lb ae/acre):	N/A
Limit of Quantification (ug/cm2):	N/A
Transferable Residue (% of Rate) For Hand-to-Mouth Ingestion Exposures	5
Transferable Residue (% of Rate) For Object-to-Mouth Ingestion Exposures	20
Predicted Time (0) TTR For Hand-to-Mouth Ingestion (ug/cm2) based upon label rate:	0.67
Predicted Time (0) TTR For Object-to-Mouth Ingestion (ug/cm2) based upon label rate:	2.7
Predicted Time (0) Total Deposition For Soil Ingestion (ug/cm2) based upon label rate:	13.5
TTR Data Source:	N/A
Toddler Hand-to-Mouth Duration On Lawns (hr/day):	2
Toddler Hand Surface Area (cm2/both hands):	20
Toddler Short-Term Frequency of Hand-to-Mouth Events (events/hour):	20
Object-to-Mouth Surface Area Contacted (cm2 mouthed):	25
Soil Ingestion (mg soil ingested/day):	100
Soil Density (cm3/gram):	0.67
Saliva Extraction Factor (50 percent/100):	0.5
Uncertainty Factor:	100
Oral NOAEL (mg/kg/day) for Toddler Exposures :	35
Toddler Body Weight (kg):	15

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Appendix E - Residential Turf Post Application Risk Assessment for MCPP-p

Spreadsheet E2: MOE Calculations

Turf and Soil Residue Levels

DAT	TTR for HTM Ingestion (ug/cm2)	TTR for OTM Ingestion (ug/cm2)	[Soil] For Ingestion (ppm)
0	0.67	2.7	9.0

Toddler Incidental Oral MOEs

DAT	Hand to Mouth (HTM) Exposure		Object to Mouth (OTM) Exposure		Soil Ingestion Exposure		Combined Exposure	
	Dose	MOE	Dose	MOE	Dose	MOE	Dose	MOE
0	0.0180	1950	0.0045	7799	6.0E-05	581983	0.023	1556

Note: Doses are in mg/kg/day

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R176822

Chemical Name: Mecoprop-P

PC Code: 129046
HED File Code: 61500 SRRD Risks
Memo Date: 7/27/2007
File ID: DPD322766
Accession #: 000-00-8015

HED Records Reference Center
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